OCT 12 1943

ENGINEERING NEWS-RECORD

OCTOBER 7, 1943

BEATING A PATH TO RUSSIA'S BACK DOOR

Waldo Bowman's story of the only American Army on the "first front"—our Army Engineers in Persia and their great job of constructing and operating our war supply lines to Russia.

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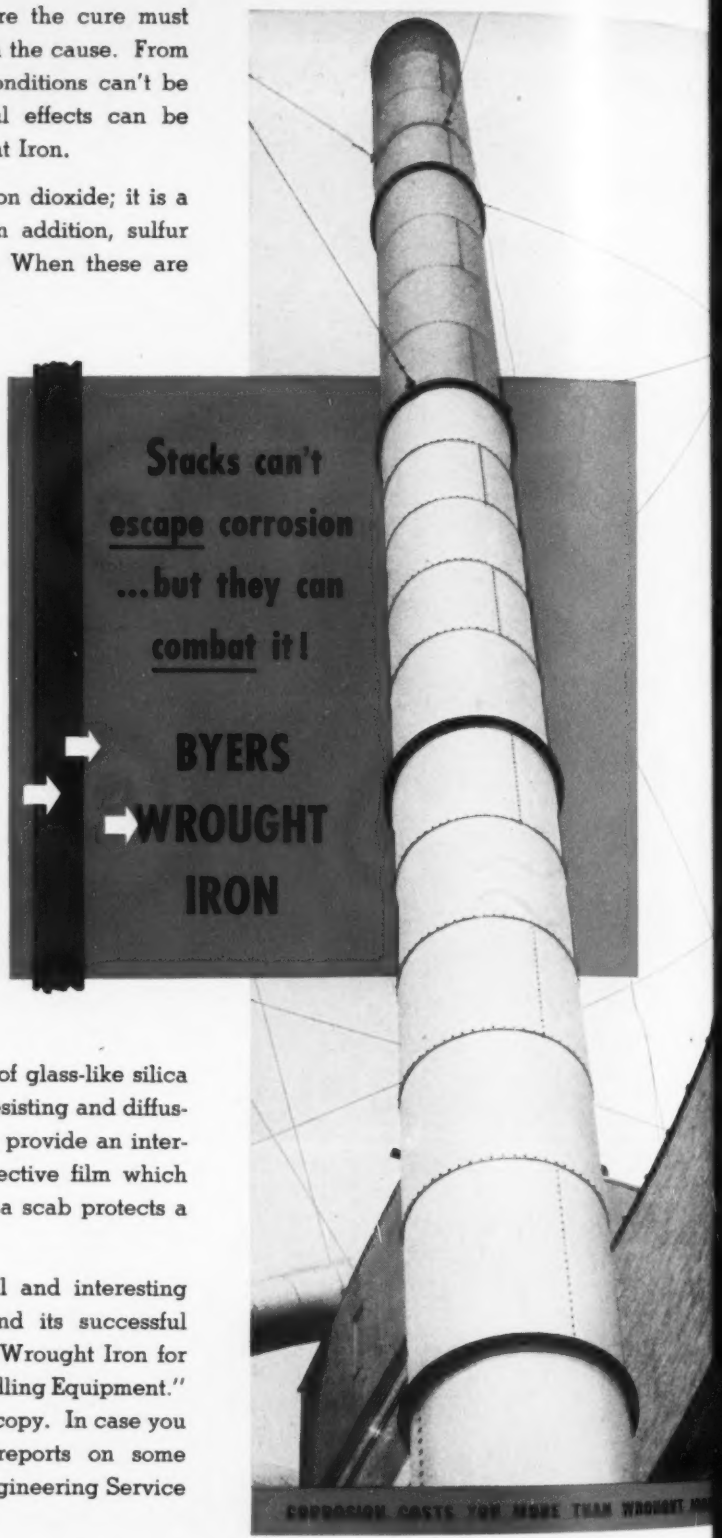

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Vol. 131 OCTOBER 7, 1943 No. 15

COMING NEXT

• BUILDINGS TO SPEED VICTORY—might well be the theme of *ENR's* building issue for 1943. Many unique problems, due to our expanding war effort, in design, planning and construction were presented for solution during the past year. How well our engineers and contractors solved these problems will be covered in a 32-page special section in the Oct. 21, issue. Of special interest will be Waldo Bowman's report on housing and other structures being built by our Army Engineers in the European Theatre of Operations.

• Two shipbuilding basins completed recently on the east coast are of special interest because of their unusual wall construction. The walls are sheet-pile cells similar to those used in cofferdam construction. These basins serve as graving or drydocks—providing space for construction of ships on a level keel or by unwatering the docks facilities are provided for repair of ships. Design and construction features will be described in *ENR* for Oct. 21.

• A successful technique for manual welding of 1⅝-in. thick steel plates has resulted from extensive experiments carried out at a west coast industrial plant. This method, like so many others which have been developed under wartime pressure, is likely to set a precedent which can be followed to advantage in the construction field. Essentials of the problem and its solution will be published in the Oct. 21, issue.

LOOKING AHEAD

• MUD, STRAW, BALLY POLES AND MUCK—Is the title of another fascinating story by Waldo Bowman on the work of our Army Engineers of the Persian Gulf Service Command, and their struggles in constructing a supply route to Russia through Iran. In "Beating a Path to Russia's Back Door" (*ENR*, Oct. 7), Mr. Bowman covered the problems involved in constructing this great highway. Buildings of many types, barracks, mess halls, warehouses, hospitals, etc., had to be built along the route. The forthcoming article to appear in *ENR* Nov. 4, describes these structures, and tells how many ancient Persian construction practices were adopted with surprisingly good results.

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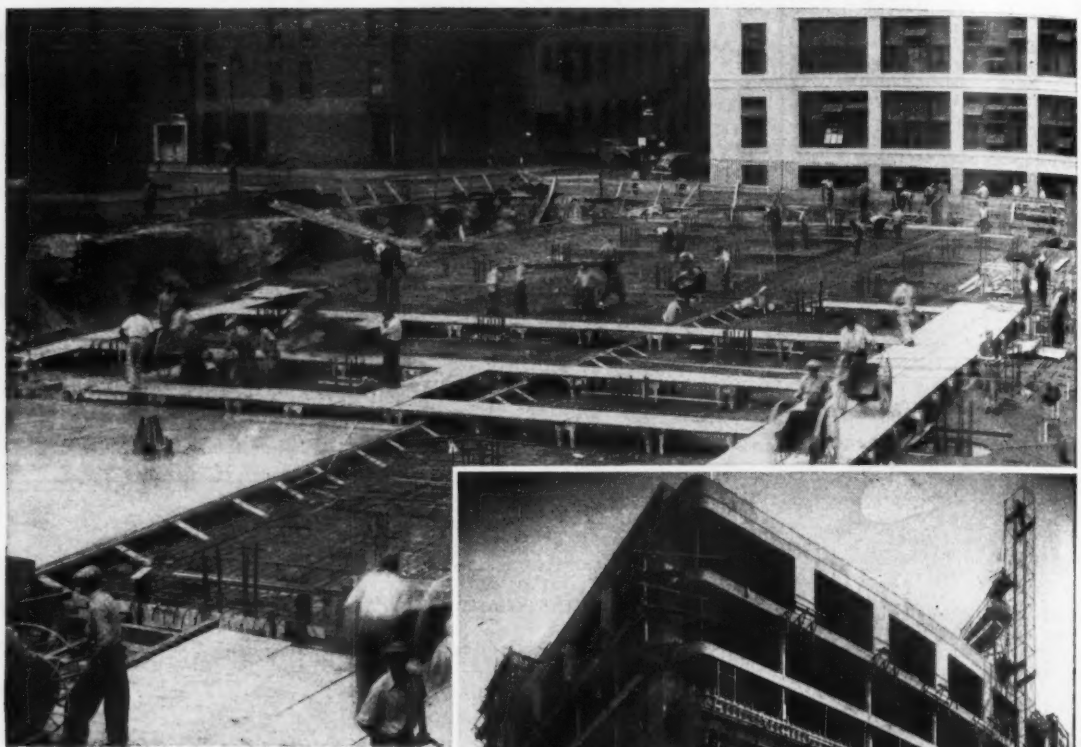


Unusual in design and function is this new nine-story addition to the Mergenthaler Linotype Company's plant built by the Industrial Engineering Company of New York. The plant takes advantage of the maximum amount of daylight by means of continuous bands of glass blocks. Eighty-five per cent of the building is kept at constant temperature and humidity. The entire front of the building curves on a 759-ft. radius so that the building conforms to the building line established by recent highway improvements. Photos show Ryerson reinforcing steels (bars, spirals, etc.), used throughout the entire structure from the ground up.

RYERSON REINFORCING STEEL-SERVICE

The Week In Engineering and Construction

NGINEERING NEWS-RECORD OCTOBER 7, 1943 • VOLUME 131 • NUMBER 15

Building trades strike ended by FPHA's drastic action

General contractors on million dollar war housing project at Houston, Tex., ordered to unionize truck drivers and unskilled labor on the job or lose their contract

A strike of nearly two months' dura- by 95 members of five building des unions at the $1,053,000 San lipe Courts War Workers Housing oject at Houston, Tex., was ended re- tly after Marshall Amis, regional di- tor of the Federal Public Housing Au- ority at Fort Worth, Tex., ordered the utson Brothers Construction Company, lder of the general contract on the oject, to unionize the truck drivers d unskilled labor on the job by August ; failing to comply, their contract uld be canceled.

The strike, against which charges were d by the Houston Chapter of Associ- d General Contractors as being the t violation of the Smith-Connally bor Act in Texas, has been the sub- t of much controversy, involving the uston Building Trades Council of the F. of L., the Houston chapter of the sociated General Contractors, the re- nal War Labor Board Conciliation rvice, the National War Labor Board Washington, the Federal Public Hous- Authority, and the Texas State Labor mmissioner.

The action of the Federal Public Hous- Authority in ordering the Knutson thers Construction Company to union- truck drivers and common labor or their contract was termed "arbitrary" Texas Governor Coke R. Stevenson, said he had complained to the tional Housing Authority at Washing- about the order.

Yield under protest

The attitude of the Knutson Brothers nstruction Company on the federal imatum to them to settle the strike expressed by their spokesman, Sev- Knutson, who said their yielding to unions' demands was contrary to their nciples but they felt it their patriotic y to finish the badly needed housing soon as possible. Attempts to secure a lement through established federal agencies have been made by the contractors, Mr. Knutson said, but a definite decision on the case has not yet been made by these agencies.

The labor trouble began June 24 when the Houston union officials demanded that the Knutson Brothers Construction Company employ only union labor through certain local A. F. of L. unions as common laborers and truck drivers instead of the non-union, unskilled laborers and truck drivers the contractors were using.

Knutson Brothers Construction Company refused this demand, pointing out that it violated the agreement made in 1938 between the general contractors of the Houston chapter of The Associated General Contractors and the skilled crafts of the Houston Building Trades Council of the A. F. of L., under which agreement the contracting company was operating on the San Felipe project. The terms of this agreement were that union skilled craftsmen would be employed and work with non-union truck drivers and unskilled laborers and that negotiation and arbitration would precede strikes. The construction company contended that it would be unfair to discharge old and trusted employees or force these unskilled laborers to join a union to hold their jobs, which was what the federal order required.

Union won't work with non-union

A few days after the refusal of the union demands, the cement finishers walked off the job in a group. By July 10, all skilled workers, which included carpenters, plumbers, iron workers and brick masons, "took a vacation" by groups and crafts.

The union labor leaders insisted this was not a "strike," and maintained this

(*Continued on page* 74)

Government to receive $2,775,000 annually for Shasta Dam power

The Pacific Gas and Electric Co., with headquarters at San Francisco, has signed a contract executed by Secretary of the Interior, Harold L. Ickes, which deprives it of the privilege of using fuel oil steam-generated energy, or energy which it now purchases from the southern California Edison Co., and commits it to buy energy from the government, generated at the Bureau of Reclamation's Shasta Dam on the Sacramento River.

The contract involves a minimum annual payment by the company of $2,775,000 over a five-year period, and it is expected the amount will be more nearly three million dollars.

There will be a readiness-to-serve charge of $125,000 per month, an energy rate of 1.5 mills per kw., and a monthly rental charge of $6,250 for that portion of the transmission line extending from the Shasta sub-station to Oroville.

The rental charge is in view of the fact that the government will deliver energy to the company at the substation, which is 25 miles from the dam, and require the company to pay for use of the remaining 72 miles of line to Oroville, which the company had been denied the privilege of building itself.

Shasta Dam is nearing completion, with the first two 75,000-kw. generators now being installed in the powerplant. It is expected the plant will begin operation with 150,000-kw. capacity next March.

After the first of January, 1945, the company will be required to pay for 150,000 kw. of power capacity and 800 million kw. hrs. annually.

The government reserves the right to withdraw as much as 50,000 kw. from the company's allotment, and to terminate the company's right to use the line between Shasta substation and Oroville, also to deprive the company of all but 125,000 kw. delivered at Oroville instead of at the substation.

Blueprint now for postwar is theme of New England waterworks meeting

At Boston meeting they stress that too little design work is being done for postwar jobs. War role of waterworks engineers and theoretical work also get attention

Theme of the two-day annual meeting of the New England Water Works Association in Boston last week, at which 600 members and guests were registered, was "blueprint now for postwar work."

E. Sherman Chase, of Metcalf & Eddy, Boston, chairman of the New England association's committee on postwar activities, reported that a national committee on postwar work has been created to represent his association, the American Water Works Association, the New England Sewage Works Association, and the Federation of Sewage Works Associations. For the activities of this committee a budget of $18,000 is planned, including $10,000 to be contributed by the Water Works and Sewage Works Manufacturers Association.

Appeal made for more work

In discussing activities of the national committee of water and sewage works development, E. L. Filby, field director, pointed out that there was much talk about postwar planning but little work actually was being done. He recommended a six-point program of action as follows:

1. Appraisal of the waterworks needs of the city or district being considered.
2. Development of an orderly program of providing the new construction found necessary.
3. Preparation, as soon as possible, of detailed plans for work seen necessary.
4. Development of a satisfactory financing method.
5. Appraisal of the legal authority under which the construction and other work is to be done.
6. Purchase of the necessary land and obtaining of the necessary easements and right-of-ways.

In discussing the financing of postwar planning, Mr. Filby stressed that this is a problem to be met individually by each state, city, town and village. He stated that federal-aid funds should not be sought, since little planning would be accomplished while waiting for such funds to be obtained.

Miss Elizabeth M. Herlihy, chairman of the Massachusetts State Planning Board, reported that too many cities are in the "planning" and too few in the "blueprint" stage. She explained that most local communities in Massachusetts have funds available for detailed planning and that in the next few months no federal aid for planning is expected.

Although much more postwar planning has been done than during the first World War, said Miss Herlihy, much of the current wishful thinking about postwar activities must be advanced to the "action" stage to get tangible results.

Arthur E. Gorman, director of the water division of the Office of War Utilities, War Production Board, warned of the potential hazard to war production should the water utilities be faced with operations during a prolonged drought. Every water utility should appraise its plant to determine points of vulnerability in case of drought and plan what special priority actions should be taken to obtain necessary materials and equipment, he stated. Mr. Gorman also made known that the supply of cast iron is not as critical as previously, but steel, copper, and aluminum are in great demand for war work and will continue to be tight.

In an illustrated talk on water supply equipment and facilities for advanced bases of the U. S. Navy, Capt. Charles T. Dickeman and Lieut. D. H. Bennett, both of the Navy's Civil Engineer Corps, described the work of the waterworks engineer in the Navy. They explained that the advance bases are of two general types: (1) Temporary and mobile; and (2) permanent. In planning these bases water demands are taken at 10 gal. per day per capita for the first type and 50 gal. for the second.

Sources of supply, depending upon local conditions, include: streams, wells, lakes, and seawater. Treatment processes include: (1) filtration and chlorination; (2) super-chlorination, and (3) distillation. For mobile bases portable filtration and chlorination units are used; these field units have a maximum capacity of about 15 gpm. when first placed in operation, but will average only about 9.5 gpm. over a long period.

Distillation is required when seawater must be used as a supply. This method is very costly, and with the tractor-mounted mobile distillers now available only 26 gal. of drinking water may be obtained per gallon of fuel oil. Because of this high fuel consumption, these units are employed sparingly.

Thomas R. Camp, associate professor of sanitary engineering, Massachusetts Institute of Technology, in discussing recent developments in analyzing the hydraulics of distribution systems stated that no satisfactory design method has been developed for extensive system. He explained that the most economical pipe size is not always obtained by the Hardy Cross method, since this procedure often requires that the system be "skeletonized," which may result in large errors. Professor Camp also found objection to the analysis of a system section by section, as he saw no assurance that adjustment of the loops or sections will not often result in a cumulative error.

Use of permanent models to analyze a system was recommended by Professor Camp as offering great possibilities. Although this method might first appear costly, it may not prove so when viewed as a percentage of the total investment in a city's waterworks system. Large savings in pipe costs were cited as the result of correct design analyses with models.

Two types of models—electric and hydraulic—were discussed by Professor Camp. The electric model is a vacuum-tube analyzer, and as yet has not been used extensively. However, the work done to date would show that it offers a number of advantages, including the fact that this type of model can be extended easily as the waterworks system is enlarged. Unfortunately, too few waterworks systems have been studied with this type of model to show the accuracy and cost of this method.

Likewise, too little work has been done with hydraulic models to show the cost and accuracy that can be expected in analyzing complete distribution systems of large size by this method. Also a number of problems have been encountered in attempting to reproduce on a miniature scale the variation in flow and operating conditions that occur in a piping network of a large system. Nevertheless, since this type of model may be used over a long period of years and may be extended as the distribution system is enlarged, permanent hydraulic models are considered to offer sufficient advantage in design work to make the method worthy of study.

New officers elected

Horace L. Clark, superintendent and general manager of the Sanford, Me., Water District, was elected president of the association for the coming year. Harold W. Griswold, deputy manager and deputy chief engineer of the Metropolitan water district of Hartford County, Conn., was chosen vice president and Arthur C. King, superintendent and treasurer of the board of Taunton, Mass., waterworks, was elected a director.

Karl R. Kennison, chief engineer of the Metropolitan District, Water Supply Commission, Boston, Mass., continues as a vice president, and Frank J. Gifford as secretary.

Harry Jordan, secretary of the American Water Works Association, was elected an honorary member of the New England group.

St. Lawrence waterway again before Congress

The St. Lawrence Waterway project is before Congress again, this time with proposition putting it squarely up to President as to the time for starting rk. since it is understood the President ls manpower and materials can not be ared for the project during the war. The Secretary of War, under whose rection work would go forward, is empowered to enter into contracts without vertising and without competitive dding. A cost-plus-a-percentage-of-cost ntracting would be prohibited, but st-plus-a-fixed-fee award would be alwed. The chief of engineers would pervise the work.

The construction of dams and power rks in the International Rapids section the river and completion of the deep terway are provided for in a bill roduced in Congress Sept. 28 by Senaor Aiken. An identical bill is in the ouse.

Power facilities and the right to use e United States' share of the waters at e project for hydroelectric power purses would be transferred to the State wer Authority of New York, set up for e purpose years ago. Upon negotiation th the President, the Authority would y $93,375,000 to the United States over period of 50 years with interest at three r cent. This amount represents the ised estimate of cost allocated to power, according to the method of allocation prescribed ten years ago in the joint recommendation of the Corps of Engineers, U. S. Army, and the Power Authority of the State of New York. The War Dept. would receive power, without charge, for operating navigation facilities; and public agencies in other nearby states, including rural electric cooperatives, would be entitled to power. Ratification would not take place till the next session of Congress.

• • •

5,000-ton concrete barge side-launched at Houston

The first ocean going concrete barge to be built in Texas since shortly after World War I, was launched Aug. 26 from the ways of San Jacinto Shipbuilding Co. (operated by McCloskey & Co. of Philadelphia) at Port Neches near Houston, Tex. The 366-ft. long, 54-ft. beam, 45-ft. deep vessel is designed to regular ship lines but has no power. Weighing 5,150 gross tons the barge was built on side-launching ways rather high above water, and successful launching of such a weight is unusual. The barge is made of light-weight concrete, about 115 lb. per cu.ft., using a burned and crushed clay aggregate and 9½ bags of cement per cu.yd.

The entire ship, including interior bulkheads, was treated by the vacuum process to remove excess water from the concrete. Vacuum processing removed about 16 percent of the 5.2 gals. of water per bag of cement used in the concrete and assisted in providing a minimum strength of 5,000 psi. for the concrete on 28-day compressive tests.

Three other barges are nearly ready for launching from similar side-launching ways in the same yard. No further concrete barges will be constructed at this yard, the contract for 24 barges having been modified by the U. S. Maritime Commission (*ENR* Aug. 19, 1943, p. 297).

Two oil tankers of concrete were placed under construction at Aranas Pass, Tex., just before the end of World War I and were launched in 1920, being used for some time in the Gulf trade. These vessels were 300 ft. long and had a carrying capacity of 2,000 long tons compared to 5,000 tons for the present vessels.

• • •

Immediate construction of Ft. Gibson Dam desired

Plans for seeking immediate construction of the Ft. Gibson Dam on the Grand River in Oklahoma were made at a meeting of the Flood Control Commission at North Little Rock, Ark., September 20. The commission meets again soon in Russellville, Ark., when the situation in regard to that project will be discussed in more detail for the benefit of those in the States of Arkansas and Oklahoma who are interested.

Recent engineering faculty changes

Dr. William O. Hotchkiss, president of nsselaer Polytechnic Institute, Troy, Y., since 1935, retired October 1, ving reached the retirement age of 65. The board of trustees said that Dr. tchkiss had received the title of presint emeritus for his "meritorious servs, particularly in the establishment and ecution of the extensive war service institute has performed during the t three years."

The trustees also announced the elecn of Dr. Matthew A. Hunter as dean the faculty and of Dr. Ray Palmer ker as dean of students. Both posits are new. Edward P. Hamilton of w York City was elected a life trustee.

Roy M. Green has been appointed a fessor and chairman of the departnt of civil engineering at the Uniity of Nebraska, in Lincoln. For the t two years Prof. Green has been conting engineer on pavements to the ssouri River division office of the U. S. gineering Corps. He is a graduate of University of Nebraska, and took post duate work at Columbia University, eiving his master's degree in highway gineering.

Wing Commander T. R. Loudon has returned to the University of Toronto as professor of civil engineering and aeronautics and will act as head of the Department of Civil Engineering, municipal and structural. He succeeds Dean C. R. Young, who was appointed dean of the faculty two years ago and who continued to act as head of the department.

Three years ago, when professor of applied mechanics, Prof. Loudon joined the Royal Canadian Air Force on special leave of absence, and in the interim has been engaged on special scientific work in Montreal and Ottawa. Robert F. Legget and Carson F. Morrison, also of the Department of Civil Engineering, municipal and structural, have been promoted to the rank of associate professor from that of assistant professor.

F. W. Edwards recently resigned as Chief of the Engineering Division, U. S. Engineer Office, Wilmington, N. C. to accept a position on the faculty of the Civil Engineering Department of The Pennsylvania State College.

An advisory committee of eleven well known leaders in business and industry have been chosen to guide the new technological institute at Northwestern University, according to Dr. Franklyn Bliss Snyder, president of the university. The committee will be presided over by Charles F. Kettering, vice president of General Motors Corp. The institute's activities in the postwar era will be considered at the committee's first meeting, scheduled to be held in December of this year.

Besides Kettering, members of the advisory committee chosen from business and industry include Henry J. Kaiser, shipbuilder and industrialist; Juan Trippe, president of Pan American Airways; James S. Knowlson, president of Stewart-Warner Corp. and former assistant chairman of the war production board; Gen. Robert E. Wood, chairman of the board of Sears, Roebuck and Co.; Ralph Budd, president of the Burlington Railroad, and Paul E. Klopsteg, president of the Central Scientific Co.

In the field of technical education the committee includes four presidents of engineering schools: Karl T. Compton, Massachusetts Institute of Technology; Robert A. Millikan, California Institute of Technology; William A. Wickenden, Case School of Applied Science, and Robert E. Doherty, Carnegie Institute of Technology.

Letter from LATIN AMERICA

By Edward J. Cleary
Managing Editor, Engineering News-Record

Lima, Peru, August 12, 1943 — My 10-day stay in this cosmopolitan city which, with its beautiful residential suburbs has a population of about 500,000, has been a continuous round of inspection trips, informal luncheon meetings and conversations with engineers. Consequently, I've gotten the impression that there are more engineers per square meter here than in any other place; the fact is that Lima is one of the major headquarters for engineering activities along the west coast of South America.

Certainly every North American engineer in this vicinity shows up sooner or later in the Gran Hotel Bolivar—and those who are located in Lima frequently drop in at the cocktail lounge (known locally as "The Snake Pit"). It was here, for example, that I made contact with W. G. Spaulding, chief engineer of the Peruvian Portland Cement Co.

Mr. Spaulding, who had worked in the Canal Zone prior to coming to Peru in 1918, was chief engineer of the Foundation Company here from 1920 to 1930. It was during this period that much of the physical development of Lima took place, in which the Foundation Company played an important part; they built the waterworks, paved many of the streets, promoted residential developments, and constructed many buildings.

Peru's cement mill

Peru has only one cement mill, located about 15 miles from Lima, where a good natural cement rock is found. At present there are three 8 x 9½ x 200 ft. and one 125 ft. rotary kilns in operation, producing about 100,000 barrels monthly of a high early-strength cement. When I visited the mill, construction of additional kilns was under way to boost capacity to 175,000 barrels monthly; equipment is difficult to get, however, and progress is slow. All the clinker is shipped to Lima, where the grinding and bagging is done at the site of the original mill. Virtually all the equipment in the mill came from North America, and the cement company, which is a national government enterprise, is awaiting the end of the war in order to complete its enlargement program.

By way of illustrating the diversity of my inspection trips, I must tell of a visit to the laboratories of the National Anti-Plague Service in company with the director, Dr. Benjamin Mostaja and Dr. John Long, senior travelling representative of the Pan American Sanitary Bureau. Dr. Long, who has been working on health and sanitation problems in Latin America since 1924, has given special attention to control of plague, which is an international communicable disease.

Plague is transmitted by a species of flea (*cheopis*) that is carried by rats. In 1930 there were 630 known localities of plague in Peru, but through systematic and continuous rat eradication programs, this has been reduced to 5 localities now. Eradication measures include distribution of poisoned bait and the use of flamethrowers and "cyanogas" in rat burrows.

Dr. Long, who probably knows more than anyone else about the sanitation problems of Latin America, has three sanitary engineers on his staff in Lima; they are Edward Hopkins and E. A. Barreda, both of Texas, and Donald Snow of Wisconsin. Hopkins and I spent several days together in Ecuador where he was advising the government on water supply and malaria control measures.

Some highway history

A glowing tribute to a North American engineer who was practicing the "good neighbor policy" two decades ago, was paid by Dr. Long when the Pan-American Highway came up for discussion. Said Dr. Long: "You young fellows on the staff of *Engineering News-Record* may not know it, but one of your men, S. T. Henry, can properly be credited with being the father of this great highway that will soon link the Americas."

The story goes back to 1922, when "S.T.", with the cooperation of United States government agencies and construction equipment manufacturers, brought to the United States a large group of Latin American engineers to make an inspection of our roadbuilding methods.

"Today", said Dr. Long, who served as medical adviser to the group, "many of these men are the directors and chief engineers of road construction in the republics south of the border. And what they are doing to advance highway construction stems from the initial efforts of S. T. Henry, who was one of the first men to envision the Pan-American Highway."

This recital prompted me to add that "S.T.", who was once an associate editor of *Engineering News*, and now is serving as assistant to the president of the McGraw-Hill Publishing Co. in Washington, keeps in close touch with Latin American developments. In fact, before I left th States, he arranged certain details of m itinerary, and I had an opportunity t read his account of the 1922 inspecti tour which, appropriately enough, w published under the title, "Roads Friendship".

Other highlights of my visit in Li included an inspection of concrete pip manufacturing by the municipal wat department—which also makes pipe fo sale on the private market; a trip t Peruvian military construction projec where building brick was being mad from mud scraped up on the site an burned in small outdoor ovens; and study of water supply sewage and refu disposal methods provided by Ricard M. Sanchez, chief of the Sanitary Divisio of the Ministry of Public Works, an Luis Mantilla, chief of the Departmen of Sanitary Engineering, Ministry o Health.

Thrill on a sand hill

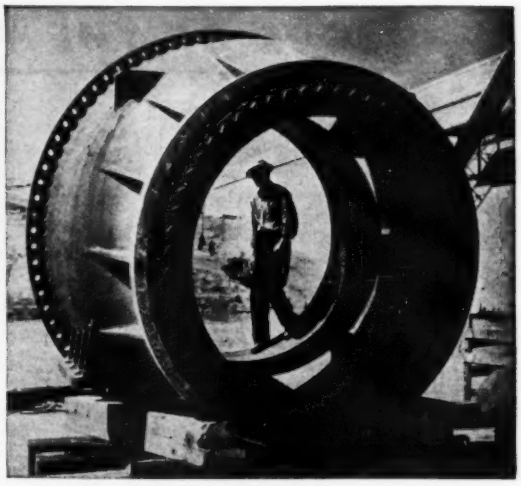
Incidentally, I should report that i driving to Lima from Chimbote on th Pan American Highway, I got the thri of a lifetime in passing over a sectio known as the Pasamayo. Here the road i nothing more than a shelf, scooped ou on the side of a huge mountain of sand The mountain slopes at an angle of abou 55 degrees into the Pacific Ocean, an the roadway shelf is halfway up—abou 500 ft. above the sea.

It is a never-to-be-forgotten experienc to drive along the outside edge of thi shelf with the knowledge that sand slide are frequent occurrences. The absence o outside guard rails, the sand runnin down in tiny slides on the inside of th cut and the occasional view of mainte nance crews that are continually at wor clearing away sand, all contribute t making this 6 mile drive one of the thri sensations in Peru.

W. A. H. Grantz, chief engineer of th Frederick Snare Corp. in Peru told m that he was caught in a sand slide on th Pasamayo some years ago, but manage to get clear before the car was envelope He says he hasn't been the same since— and I know exactly what he means.

Construction of a housing project de signed to accommodate 1,100 worker is scheduled to begin immediately i Kenosha, Wis., following the recent approved action by the city council lea ing a site to the federal government The national housing agency plans t erect 265 demountable houses and 15 trailer homes on the proposed site ad joining the Nash-Kelvinator Corp. plan

Buildings to be constructed will hou workers and their families who will b imported from the Eau Claire area b the war manpower commission, it is re ported.



Friant Dam in operation soon with borrowed Boulder Dam valves

Lacking valves for regulation, the water of the San Joaquin River flows without restraint through the permanent river outlets in Friant Dam. To provide additional irrigation water for the San Joaquin Valley for wartime food production the United States Bureau of Reclamation will control two of these openings with valves borrowed from Boulder Dam and will plug the remaining ones until after the war, when permanent installations will be made. Control of these openings will permit storage in Millerton Lake, the reservoir created by the dam, and subsequent delivery of irrigation water into the canals leading from it.

The above huge casting is one of three needle valve cases shipped from Boulder Dam for temporary installation on river and canal outlets through Friant Dam. The Bureau of Reclamation expects to make deliveries of water from the 520,000 acre-ft. reservoir in March, 1944.

Texas completes plans for much highway work

Twenty-six million dollars worth of highway construction in Texas can be put under way within thirty days after the war ends if sufficient funds are available, DeWitt C. Greer, engineer for the Texas Highway Department announced. This represents 26 percent of $100,000,000 worth of needed road improvements for which plans are being drawn. The department now has $16,000,000 worth of work in progress, mostly of emergency nature and Mr. Greer reported that materials and machinery are becoming available again, with the handling of other wartime construction. Costs of available materials are relatively high, and the Texas Highway Commission prefers to postpone work whenever possible to a date when more roads can be built for the money. In 1940, Mr. Greer said, an average mile of concrete pavement in Texas cost $20,000, compared with a present cost of $26,000. Truck traffic in Texas is at an all-time high. Battered sections of paving provide evidence that many trucks are not observing the state's gross load limit of 38,000 lb. Replacements must be made in many places on the Texas highway system, Mr. Greer said.

The department is planning with federal authorities for four-lane international highways and with cities for entrances of these arteries. By conserving its funds wherever possible, Greer said that the department hopes to have both plans and money available.

"For this we fight"

A number of topics in the second series of 13 NBC Saturday evening radio programs on post-war questions are of special interest to engineers and builders, namely:

Oct. 16—"Financing Post-War Prosperity"—speakers, Beardsley Ruml, chairman, New York Federal Reserve Bank; John H. Fahey, Federal Home Loan Bank Commission.

Oct. 23—"Better Houses—And Cheaper" — speakers, John B. Blandford, administrator, National Housing Agency; Lewis H. Brown, president, Johns-Manville Corp.; Norman Bel Geddes, industrial designer.

Oct. 30—"Public Works in Post-war America" — speakers, Willard T. Chevalier, publisher, Business Week; Maj. Gen. Philip B. Fleming, Federal Works Administrator; David E. Lilienthal, chairman, Tennessee Valley Authority.

The general title of the series is "For This We Fight" and the half-hour programs are from 7 to 7:30 p.m., Eastern War Time. The broadcasts are by the N.B.C.'s Inter-American University of the Air, in cooperation with the 20th Century Fund and the Commission to Study the Organization of Peace.

Pollution of Rouge River reported at Dearborn

Dangerous pollution of the Rouge River in Dearborn, Mich., was charged by city officials recently in a letter to the State Department of Health. It was pointed out that the pollution results from an overflow of Detroit sewage, attributed to inadequate pumping facilities resulting from the inability of Detroit to finance more adequate facilities. The letter was signed by Fred R. Storrer, city engineer, and Dr. Martin F. Buell, city health officer.

A sludge on the surface of the river has become a public health menace and has converted the river into an open sewer, it was charged. The situation is all the worse because recent high lake levels have retarded the river's flow. It was pointed out in the letter that United States aid might be enlisted on grounds that the Dearborn area is heavily populated with war workers. Detroit sewage system has 11 *storm* outlets into the upper Rouge River between Tireman and Pembroke Avenue. These outlets are fed by combined sewers from which the sanitary flow is collected by an intercepting system and lifted through three temporary sanitary pumping stations into the Dearborn system and then treated at the East Side Dearborn Sewage Disposal Plant.

The pumping stations handle the average sanitary sewage from this district while the large volume of storm water overflows into the river at these points.

JOBS OF THE WEEK

HOUSING, etc. Washington, D. C.
Harwood-Nebel Construction Co., Inc., Washington, D. C., has been awarded a contract to build additional housing and recreational facilities, WAVE Quarters D, Nebraska and Massachusetts Aves., by the Bureau of Yards & Docks, Navy Department, Washington, D. C., at $1,121,500.

HOUSING, Orange, Tex.
R. P. Farnsworth Co., Orange, has been awarded contract by Public Housing Authority, Fort Worth, Tex., for dwelling units at an estimated cost of $847,280. Stone, Pitts, Salisbury, McGinty & Werlin, Houston, are the architects.

HOUSING, Ohio
Public Housing Authority, Cleveland, O., awarded a contract for housing to Bedford Hills Construction Co., East Hartford, Conn., at $1,437,000. Potter, Tyler & Martin, Cincinnati, O., are the architects.

PENICILLIN PLANT, New Jersey
Walter Kidde Constructors, Inc., New York, N. Y., has been awarded the contract for a plant to manufacture pencillin by the Heyden Chemical Co., New York, N. Y. The estimated cost with equipment is $1,000,000. Austin Co., New York, N. Y., is the engineer. The Defense Plant Corp. will finance.

APARTMENTS, Portland, Ore.
John B. Larsen, Portland, Ore., has been awarded a contract to build eleven buildings, garden type apartment, by Sandycrest Terraces, Inc., Portland, Ore. The estimated cost is $750,000. H. A. Herzog, Portland, Ore., is the architect.

HOUSING, Oklahoma
Joseph P. Snyder, Fort Worth, Tex., submitted the lowest bid to the Public Housing Authority, Fort Worth, Tex., for a housing project, at $579,000. Winkler, Reid, Noftsger, Lawrence & Ellinger, Oklahoma City, Okla., are architects.

HOUSING, New Jersey
Mutual Construction Corp., New York, N. Y., was the lowest bidder at $579,420 for constructing housing when Public Housing Authority, New York, N. Y., opened bids. Williams & Churchill, New York, N. Y., are the architects.

IMPROVEMENTS, Arizona
Basich Brothers Construction Co., Alhambra, Calif., will construct improvements in Cohise County for U. S. Engineers, Los Angeles, Calif. The estimated cost is between $700,000 and $800,000.

MESS HALL, Michigan
F. H. Martin Construction Co., Detroit, Mich., has been awarded a contract by the U. S. Engineer, Detroit, for a mess hall in Wayne County. The estimated cost is less than $1,000,000.

HOUSING, California
Public Housing Authority, San Francisco, Calif., has received the lowest bid from L. H. Hansen & Sons, Fresno, Calif., for constructing housing, at $517,945. Blanchard, Maher & Ward, San Francisco, Calif., are the architects.

AIRPORT, El Paso, Tex.
Civil Aeronautics Administration, Fort Worth, received the lowest bid on schedule 1, airport improvements from Texas Bitulithic Co., Dallas., $94,800; on schedule 2 from Hargrave Construction Co., Cedar Rapids, Ia., $677,150; schedule 1 and 2 from Standard Paving Co. and Layman Construction Co., Tulsa, Okla., $880,025.

WAREHOUSES, California
U. S. Engineers, San Francisco, Calif., will construct five warehouses in San Francisco Bay area at a cost of less than $1,000,000. Morrison-Knudsen Co., Inc., and Ford J. Twaits, Los Angeles, are the contractors on the project.

HOUSING, Michigan
Tovall Construction Co., Baltimore, Md., has been awarded a contract for housing by the Public Housing Authority, Cleveland, O., at $828,800. Clair W. Ditchy, and Paul R. Sewell, Detroit, Mich., are the architects.

CONSTRUCTION, Washington
Woodworth & MacDonald Building Co., Tacoma, Wash., has been awarded the contract for additional unspecified construction in Grant County by the U. S. Engineers, Seattle, Wash. The estimated cost is $700,000.

Note—Additional bidding and contract news on many projects large and small appear in the Construction News section beginning on page 76.

Building trades strike ended by FPHA

(Continued from page 69)

in the hearings before the National War Labor Board later.

After vain attempts to settle the dispute by the Houston Housing Authority and Knutson Brothers Construction Company, the strike was certified to the War Labor Board.

Fred H. Martin of the disputes staff of the regional office of the War Labor Board, conducted hearings on the strike in Houston during the week of August 23. He failed to settle the controversy and it was referred to the National War Labor Board at Washington.

The National War Labor Board refused to take jurisdiction in the case, sending it back to the United States Conciliation Service for further mediation although Mayor Otis Massey of Houston had wired the National War Labor Board asking it to take speedy action to end the strike.

By this time, August 29, Governor Stevenson had sent Texas State Labor Commissioner, John Reed, to Houston to investigate the strike. While Mr. Reed was in Houston, the Knutson Brothers Construction Company received the federal ultimatum to recognize the union or have their contract canceled.

. . .

Too much salt water troubles Wilmington, N. C.

Wilmington, N. C., long troubled with high salt content of its municipal water supply at periodic intervals, again reports an increase in the salt content. McKean Maffitt, superintendent of the city water and sewer department, announced September 22 that the salt had reached 2,500 p.p.m., but expressed the hope that rains along the Cape Fear River watershed would remedy the trouble.

In 1941, the salt trouble became especially acute and a series of deep well pumps was installed throughout the city. Later the city also let contracts to run a new 21-mile pipeline to King's Bluff, further up the Cape Fear River to the nearest point which, according to engineers, would insure the city a salt-free water supply.

The program was curtailed by the War Production Board, however, because of the shortage of critical materials, and the project was shortened to a line to a temporary pumping station at Navassa, 14 miles up the river from the present intake. Work on this project now is under way, but city officials still are attempting to get WPB approval for the King's Bluff project which surveys show would insure the city an absolutely salt-free water supply.

OBITUARY

Daniel M. Wheeler, 97, a retired civil engineer, died Sept. 29 at Pittsfield, Mass. Born in Rutland, Mass., Mr. Wheeler was a member of the first class of the Massachusetts Institute of Technology in 1868. After engaging in the building of railroads and various public works in several states, he became engineering inspector for the Department of Public Works of Massachusetts, resigning in 1916 at the age of 70. Recently he had been an inspector of land titles.

J. W. Wood, for more than 30 years a building contractor in Atlanta, Ga., died there Sept. 23.

James O'Hear, 79, civil engineer, died September 24 at Charleston, S. C. He was largely responsible for the development of North Charleston, serving as an officer of three companies which developed it.

Joseph William Ricketts, 67, head of the construction firm which laid out the city of Coral Gables, Fla., died Sept. 16.

Morris Copaken, 64, a contracting engineer, died at Kansas City, Mo., Sept. 2. Mr. Copaken went to Kansas City in 1906 and became a building and contracting engineer and continued in that business for thirty-seven years until the time of his death.

Oscar W. Rosenthal, 67, president of Builders Association of Chicago for 20 years, died Oct. 1 in Chicago. He had been head of Rosenthal, Cornell and Co., building contractors, for 40 years and had been president of the National Association of Building Trades Employers.

Joseph B. Gemberling, 75, for 30 years eastern division construction manager of the American Bridge Co., died Oct. 3 at Philadelphia, Pa. Mr. Gemberling directed work on the Delaware River Bridge between Philadelphia and Camden, the Hell Gate and Triborough Bridges in New York, and on several large buildings in Philadelphia.

Lieut. Com. Henry Kent McCay, USN (retired), 83, a former city engineer of Baltimore, Md., died Sept. 21. Commander McCay was born in Augusta, Ga. He was graduated from the United States Naval Academy in 1884. Three months later he resigned from the navy and went to Germany where he completed an engineering course at the University of Berlin. After his return he entered the employ of an engineering firm.

News of the Week
Continued on p. 150

CONTRACTS AND CAPITAL

CIVIL ENGINEERING construction volume in continental U.S. totals $37,784,000 for the week. This volume, not including construction by military engineers abroad, American contracts outside the country, and shipbuilding, is 26 percent below a week ago, and 73 percent lower than in the corresponding 1942 week.

Private construction declines 68 percent from a week ago, and 51 percent from a year ago. Public work is 4 percent below the preceding week, and 75 percent under last year.

The current week's construction brings 1943 volume to $2,526,157,000, an average of $63,154,000 for each of the 40 weeks of the period. On the weekly average basis, 1943 construction is 68 percent below the $7,975,782,000 for the 41-week 1942 period. Private construction, $335,030,000, is 31 percent lower than last year, and public construction, $2,191,127,000, is down 70 percent when adjusted for the difference in the number of weeks.

In the classified groups, gains over last week are in bridges, industrial buildings, earthwork and drainage, and unclassified construction. Bridge construction is the only class to gain over a year ago.

New capital for construction purposes for the week totals $770,000, and is made up of $755,000 in state and municipal bond sales, and $15,000 in RFC loans for public improvements. New construction financing for the 40 weeks of 1943, $3,037,977,000, is 67 percent below the $9,533,078,000 reported for the 41-week period a year ago.

CONTRACTS
Continental U. S. Only
(Thousands of dollars)

	Week Ending Oct. 8 1942	Sept. 30 1943	Oct. 7 1943
Federal	$120,051	$29,661	$29,141
State & Municipal	8,745	3,915	3,203
Total public	$128,796	$33,576	$32,344
Total private	11,059	17,146	5,440
TOTAL	$139,855	$50,722	$37,784
Cumulative 1943 (40 weeks)			$2,526,157
1942 (41 weeks)			$7,975,782

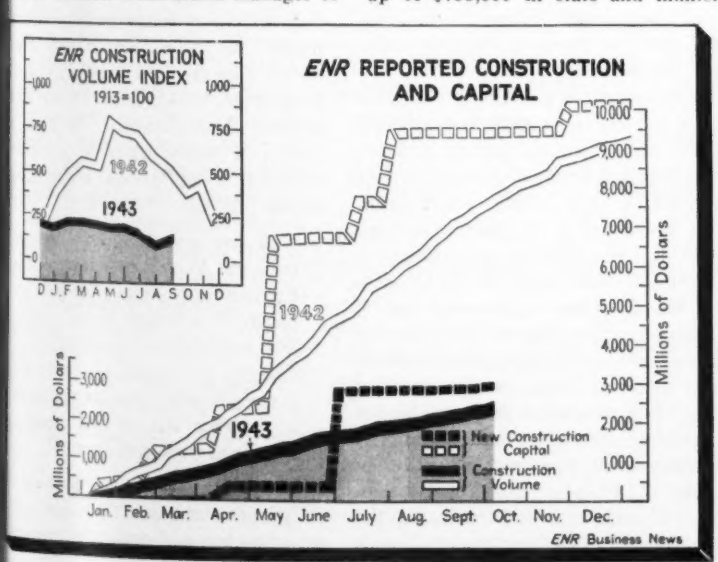
Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works $25,000; industrial buildings, $40,000; other buildings, $150,000.

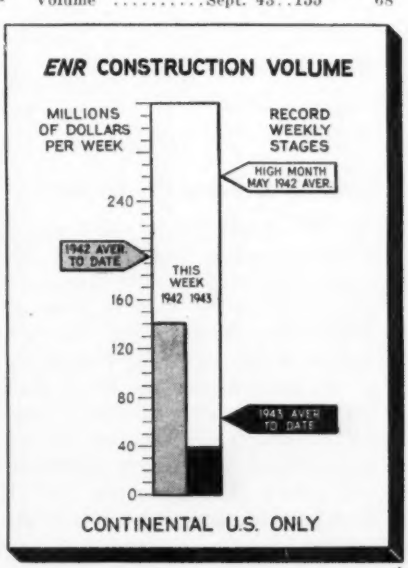
NEW PRODUCTIVE CAPITAL

	Cumulative 1942 41 weeks	1943 40 weeks
NON-FEDERAL	$566,180	$284,139
Corp. Securities	169,889	17,408
State & Mun.	184,136	101,053
R.F.C. loans	129,455	14,545
FPHA loans	.....	3,133
R.E.A. loans	.....	20,000
Fed.-Aid Hwy.	82,700	128,000
FEDERAL	$8,966,898	$2,753,838
TOTAL CAPITAL	$9,533,078	$3,037,977

ENR INDEX NUMBERS

Index Base=100		1913	1926
Construction Cost	Oct. '43	294.31	141.47
Building Cost	Oct. '43	231.29	125.03
Volume	Sept. '43	155	68





Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

Doubly Reinforced Beams

Sir: In the article by J. F. P. Tate, in the September 9th issue of *Engineering News-Record*, entitled "Simplified Equations for Concrete Beams" there is a slight error in one of the terms in the computation of the moment of inertia of the illustrated problem. The value of y-z should be 3.56 instead of 3.36, making I_t equal to 5,890 in.⁴

The writer checked Equation 1, the derivation of which is quite brief. The author is entirely justified in neglecting the "minus one". In fact, the latest building codes allow twice the effectiveness of the compression steel as calculated by the straight line relation between stress and strain, providing of course the value does not exceed the allowable tension stress.

If the moment of inertia about the flexural axis is known, the section moduli may also be obtained from the relations:

$$S_c = I_t/y \text{ and } S_t = I_t/ny_1$$

The writer believes the equations form an excellent basis for determining stresses in reinforced concrete beams. However, as used directly, they are essentially a method of analysis rather than one of design. The publication of a complete set of tables for various sections would be very beneficial to concrete designers.

M. W. ROSENSTEIN
Chicago, Ill.

Error in Crusher Production

Sir: We should like to call your attention to certain inaccuracies in the article, "Building the Inter-American Highway," in the Aug. 26 issue of *Engineering News-Record*. In the caption under the third picture on p. 85, three figures are listed. The first one refers to a 15 x 35-in. primary jaw crusher. We know of no manufacturer who builds a crusher with a 15 x 35-in. primary; most of them build crushers with a 15 x 36-in. primary.

The next figure refers to a 22 x 44-in. secondary roller crusher. Manufacturer's practice is to give the diameter of the rollers first, and the width of the face second. In other words, it should be 44 x 22 in. However, we know of no one who builds a crusher of this size. If the crusher described was a Pioneer, it should have a 40 x 22-in. secondary. (It is a Pioneer plant—*The Editors*).

The third figure calls attention to a crusher production of 100 cu.yd. daily. We have a letter from the Martin Wunderlich Co. signed by Roy Mork and dated May 22, 1943, which states: "The Pioneer plant is really doing a very excellent job, and you would be quite proud of the unit. We have gotten up to 1,000 cu.yd. in a 10-hr. shift, and rather consistently, slightly under that." This statement is somewhat different from the 100 yards daily indicated in your article.

O. J. ELLERSON,
Assistant Secretary,
Pioneer Engineering Works, Inc.,
Minneapolis, Minn.

British Road Design

Sir: In the July 22 issue, p. 172, there appeared comments by your editor Mr. Bowman on the rural roads of Great Britain, and how amazingly well these road surfaces were withstanding the effects of wartime transportation.

The writer has a feeling that British road engineers have consistently followed fundamentals in their highway construction, both in base and surface courses. A book, written some thirty-five years ago by a prominent engineer (it was used as a textbook at Columbia University in 1914) gave an insight into the thoroughness of British road engineers, even at that time. The author described methods and materials used in the construction of tar macadam surfaces, his experiences, observations and results of investigations and tests on different types of surfaces. He became convinced that securing density in the surface was of paramount importance to insure a lasting surface. As a test of the relative density of surface mixes in common use, he had metal rings imbedded in surfaces at the time of laying. Later, specimens of the surface included in these rings were cut from the pavement and subjected to percolating tests. The results of these tests were very enlightening. Some specimens allowed water to pass through readily, others in which there was a special gradation of materials were almost entirely impervious.

American engineers have been too prone to adopt untried shortcuts, and our greatest progress has been through the development of efficient plant and equipment for constructing highways. There are cases where projects twenty miles or more in length have been constructed of a road-mix using one size stone so open that one could readily see through a specimen held in the hands. The intention of course, was to give capillary moisture the opportunity of evaporating but the construction also permitted a free flow of rain water into the base. The result was that the base softened to such an extent that the pavement failed and had to be replaced.

Through the years the office of British road engineer has been one of honor, trust and long tenure occupied by men with complete authority and responsibility. In this respect the British road engineer has had an advantage over many of his American cousins.

C. WINSTON COOPER,
A.P.O. 675, c/o Postmaster, Miami, Fla.

"No Safety Nets"

Sir: Reference is made to the editorial under the title "No Safety Nets" which appeared on page 319 in the August 26, 1943, issue of the *Engineering News-Record*. We have received a letter from a prominent member of the National Safety Council, as follows:

> "I am enclosing an editorial from the August 26th issue of the Engineering News Record entitled "No Safety Nets." Since this is a national publication, I thought you would be interested in the adoption of some measures to correct the misinformation contained in this editorial."

Upon examination of the editorial it becomes obvious that our correspondent has misinterpreted the mean-

of the editorial. However, the last agraph is very easily misinterted, particularly the sentence ich states, "Safety measures have place in all-out war."

Your publication, as well as others the McGraw-Hill Publishing Comy, have always been exceedingly perative towards the safety moveent. We feel sure you will not wish r readers to get the mistaken imssion that this article referred to ident prevention.

Possibly you will wish to clarify meaning of this reference in a r editorial.

FLOYD E. FRAZIER
Safety Engineer,
National Safety Council,
Chicago, Ill.

We had no purpose to advocate any ening of safety measures on war s, as a careful reading of the edial in question will show. The "war k" into which we said people hesid to enter for lack of "safety nets" not the actual work itself but ply the contracts for such work. terms "safety net" and "safety sures" were used in a figurative se. Obviously, a sentence picked of such figurative writing, when ched from its context, can be misderstood.

Physical safety measures such as promoted by the National Safety ncil are more important in war in peace because every man-hour due to accidents slows our all- war effort by just that much.—EDITORS.

er-American Highway

Your accounts of the construcof the Inter-American Highway been very interesting, especially ne who like myself knows the ter-. The pictures of the engineers loyed thereon in the September 2 e, and the many others you have lished in previous issues, cause however, to wonder why this number of able, highly trained accustomed to roughing it in field, accustomed to meeting and coming difficulties, should be so essly employed. We read in the ers every day frantic appeals for e men, of the drafting of fathers, e added manpower necessary for full prosecution of the war and for winning of the war now.

his highway is of very little, if use except as an ornament, as a pleasure drive which will require expensive maintenance. It will be of little use in the defense of the Panama Canal, it will not promote in the least degree friendliness between the nations it traverses, it has no commercial or economic justification, and certainly has nothing to do with winning the war except that it takes a lot of men, construction machinery and a considerable amount of structural steel away from the war effort.

FRED LAVIS
Consulting Engineer,
30 Broad St.
New York, N. Y.

No Stiffening Trusses

Sir: Referring to Mr. Witmer's letter in your issue of September 9, entitled "Bridge Stiffening Trusses," he states that he "knows of no other suspension bridge in which such construction (no stiffening trusses) has been permissible."

Roebling built a suspension bridge, of four 134 ft. spans, over the Delaware River at Lackawaxen, Pa., in 1848 as a canal aqueduct bridge. This structure was converted to highway use when the canal was abandoned, by the substitution of a roadway for the canal conduit. The sag of the cables in this bridge was about 1/12 of the span and, owing to the relatively small highway live load substituted for the much greater dead load of the conduit filled with water, plus the great stiffness of the cables, due to their small sag and low unit stress from the lesser highway loading, the bridge for highway use needed no stiffening truss. It was remarkably stiff under heavy vehicular loading.

The case cited is an illustration of the fact that the main cables are the dominant stiffening elements of any suspension bridge.

F. H. FRANKLAND,
Director of Engineering,
American Institute of Steel Construction

Transportation in South America

Sir: The realistic article by Mr. Lavis on South American transportation (*ENR*, Aug. 12, p. 277) is very timely, since the tendency now is to view that part of the world through rose colored glasses. The elementary, or "colonial" type of commerce that he describes, however, may not last much longer. The trend toward industrialization that started during the first world war has made considerable progress in some countries and the greatly increased trade between Latin American countries that has resulted from this war may continue.

Mr. Seibert presumably based his article on the assumption that a serious attempt would be made after the war to develop the interior of South America. It appears that the governments concerned fully intend to take action on this matter, and that this country, in furtherance of its Good Neighbor policy, will probably cooperate. Unless this is done there is no need for any additional transportation facilities in this region.

If there is any large scale development in the Amazon valley alternate outlets will be very desirable, especially toward the south. Manufacturers in southern Brazil and Argentina may very soon need the jungle products of the upper Amazon, and it will, in return, require manufactured products. It will probably be a long time before there is enough commerce to justify an all-water route between the Amazon system and the Paraguay, but it is not too early to start surveys and studies on such a project.

A water-rail route between these valleys will be comparatively inexpensive. There is, or was in 1941, a railway under construction between Corumba, on the Paraguay, and Santa Cruz, Bolivia. A proposed extension of this line from Santa Cruz to Puerto Ichilo, on the Mamore, a distance of approximately 105 miles, is all that is needed to complete such a route.

Water-rail routes are not as desirable as all-water or all-rail, but they are now being used with varying degrees of success along the Madeira, the Parana, the Sao Francisco, the Nile and the Congo.

R. N. GRAHAM,
New Orleans, La.

Architect-Engineer's Name Misspelled

Sir: An error occurred in *Engineering News-Record* Aug. 19, 1943, p. 298 in the description of the high-speed construction methods followed in building a Midwest war plant. The architect-engineer was *Russ & Harrison*, not Russen & Harrison as printed.

MERRITT HARRISON,
Russ & Harrison,
1001 Architects Bldg.,
Indianapolis, Ind.

EDITORIALS

VOLUME 131 NUMBER 15

October 7, 1943

Challenge to Ingenuity

SANITARY ENGINEERS in the States who have been going through the trials of improvisation and substitution in designing sewage disposal facilities will read with special interest the story of the El Salvador treatment plant on page 88 of this issue. They will have a sympathetic understanding of the problems faced by engineers of the Office of the Coordinator of Inter-American Affairs who had to build with available local materials and not with what they might have preferred to use. The final result as evidenced by the completion of a simple, effective and low-cost treatment plant is an achievement that does great credit to the ingenuity of the designers. Like their colleagues at home, engineers in foreign fields are meeting conditions that call for the greatest flexibility of mind and ability for adaptation. The record, both here and abroad, provides many examples of how well the job is being done.

Jobs in Postwar Planning

DESPITE THE PROBLEM of getting enough men for the Army and Navy and still keep our war factory forces at full strength, unemployment for certain classes of construction industry specialists looms as a distinct possibility. Whereas skilled, semi-skilled and unskilled construction labor continues to be needed for shipbuilding, manufacturing and transportation, and young engineers and construction men will be called into the armed services, older engineers, architects, estimators, draftsmen and contractors will find the demand for their talents dropping as projected new construction drops. To waste these skills at a time when so much needs to be done on postwar work would be short-sighted indeed, and it need never happen if postwar planning will be accepted, as it should be, as a part of our war effort. Every city and every state should forego all procrastination on this subject immediately. These engineers and architects who now are becoming available are among the best in the profession, and the assistants that they can hire are of equally high caliber. In this connection, those who get postwar planning assignments would do well to add construction men to their staffs; their knowledge of field practices can eliminate many problems of construction before they become part of the accepted plan. Here is a chance for the profession to combine design and construction talents, as they should always be combined and so seldom are. And here is an opportunity for the nation to get its postwar planning on a war-speed basis, as it inevitably must.

Airport Pavements

DESPITE THE CONSTRUCTION of hundreds of miles of airfield paving in the past two years, design and construction practices are still in a state of flux. One reason for this is that construction has necessarily been so rapid that time has not been available to correct errors by experiment or to disseminate knowledge of proved practices. A second cause of design uncertainty relates to increases in airplane wheel loads. Before the war 25,000 lb. loads were common, now 65,000 lb. loads are frequent and 100,000 lb. concentrations are being talked about; there are runways pavements built since the war that have had to be increased in thickness, "double decked," to take care of these greater loads. Another unsettled design problem relates to the proper choice between rigid and flexible pavements, and uncertainty still exists as to how much greater load carrying capacity should be built into hardstandings, aprons and taxi tracks than into runways. It has been concluded that the capacity should be greater, because of vibration and standing loads, and there is no question about the importance of providing good foundations under every pavement. Beyond that the field is open for great improvement. With heavy cargo planes coming along, the airport pavement problem takes on a postwar aspect of large proportions, of sufficient importance to command immediate attention.

Construction Equipment Problem

WHILE CONGRESS is to be commended for turning to the problem of postwar disposition of surpluses, it might well be reminded that the immediate need is for study of the situation rather than for the enactment of laws. Its concern lest the public economy suffer from uncontrolled disposal of left-overs when the fighting ceases is shared by the construction and allied industries and crafts. But those most directly concerned—dealers, contractors and manufacturers—have only begun to think about the

blem and they need stimulation and guidance. hough the War Production Board frowns on the gestion of planning for postwar at this stage in conflict, there are among its personnel individ- who have an intimate knowledge of the situa- and who might even be spared to work on e problems before the war ends. Conceivably, there are men in the Office of Price Adminis- ion who could turn their thinking from ceilings floor-price fixing, and contribute something on r-surplus prices. The proposed congressional rplus War Property Committee is hardly the wer to the problem since, as now planned, it ld have until six months after the war to make report, during which all government war equip- nt would be frozen. Probably this will be the iod, while the construction industry is getting k to peacetime operation, that most advan- eous use could be made of war leftovers. The ious need is for a study now, to establish post- r principles and formulate workable practices equitable disposition of surplus government- ned equipment.

the War Fronts

MMENTATORS AND COLUMNISTS daily discuss the sequences of present and potential war-front elopments in the light of agriculture (Can rth Africa support itself?); of economics (Will ly's industry be of any use to us?); of transport ow can we control the threat of heavily-armed boats?); of geography and history (Has the itish Eighth Army yet rivaled the travels of Han- al or Alexander?); of ordnance (Are our guns l equipment superior to Germany's?); and of eign relations (Will Russia provide us bases m which to bomb Japan?). But noticeably absent e been discussions of the effect of military moves engineering and construction, or vice versa. pose the question: How come? This is an gineer's war, isn't it?

For anyone plagued by such questions, the only ution apparently is to be his own military expert. the very least, it would be as interesting and as fitable as speculating on the outcome of the rld Series. This week, for example, one might culate as follows:

Now that the Germans have been forced out of rsica, the pattern of our strategy in the attack on southern Europe comes into bolder relief. From bases there, fighter escorts can cover bomber raids along the whole western coast of Italy and even into southern France. First, however, we must develop the bases, for Corsica's half-dozen airports are little more than makeshift landing fields. Here is a rush job for our Army Engineers and their fast dirt-moving and paving equipment. Likewise, the Foggia airfields in Italy, captured by the British, must be the scene of immediate, widespread reconstruction operations.

The week's fighting has also brought about the fall of Naples. What we are finding there is told in photographs that show port structures devastated by bombs and pier slips blocked by sunken ships. We must have this fine harbor as a supply base for further Italian operations, and this will call into action our Engineer, and perhaps Seabee, salvage and construction experts.

The favorable turn of events in Italy, as characterized by our drive beyond Naples, and the growing revolutionary activities in Jugoslavia might well foreshadow Allied landings across the Adriatic in the Balkans. Should these develop they could readily expand into a drive eastward to Salonika. And once such a wedge is driven under the Axis, Greece and Crete would be as unhealthy for the Germans as Kiska was for the Japs after we took Attu. The result would be the opening of the Dardanelles to our ships, which could then carry supplies to Russian ports on the Black Sea instead of circumnavigating Arabia to get into the Persian Gulf and to the Great U. S. supply corridor through Iran. Under such circumstances, the huge engineering and construction activities of our Army Engineers in Iran would quickly and logically come to an end.

But if this particular future battle promises to end a construction operation, there is another one coming up that will augment our Engineer activities. This is the drive eastward against the Japs, for the supply of which we are already building invasion roads from India into Burma. No matter where you cast your thoughts in this global war, battle developments anticipate, cause or end some American construction job.

Thus, there is a civil engineering aspect to the war, just as there are agricultural, transportation, economic and political aspects. It is all in your point of view.

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ENGINEERING ABROAD AS SEEN BY ENR EDITORS

Beating A Path to Russia's Back Door

Waldo G. Bowman
Editor, Engineering News-Record
(By airmail from the Persian Gulf Service Command)

● A sizable share of the credit for the recent great increase in Russia's offensive wallop must inevitably go to our Army Engineers in the Persian Gulf Service Command for turning a wide strip of Iranian desert and mountain territory into a great supply route over which they are pushing munitions at a rate that is taxing Russia's ability to take them. Port facilities, roads, railroads, airfields, repair shops, truck and plane assembly plants, camps and communication lines have been built under punishing climatic conditions. They constitute a spectacular engineering and construction achievement.

YOU CAN BOARD AN AIRPLANE in San Francisco, fly 10,000 miles east or 10,000 miles west—it makes no difference—along the great circle route corresponding to about 35 deg. N. latitude and find yourself in the kingdom of Iran, or Persia. Here, quite literally half way around the world, you will discover one of America's most vital contributions to the Allied victory now in the making, and you will find thousands of American officers and troops toiling and sweating out one of the toughest assignments of the war. The contribution consists of a group of supply routes over which American war materials and food are being transported by Americans to Russia in such mounting volume that her once desperate defense has been definitely transformed into a victorious offense. The assignment was to build, remodel, maintain and operate the facilities—ports, assembly plants, roads and railroads—that get the supplies from our ships to the dumps and transfer points that serve the Russian front.

Much of the building assignment has already been accomplished, and so successfully have supplies been delivered that Russia has several times had to call a halt until her overburdened transportation facilities could catch up. Maj. Gen. Donald H. Connolly, well-known engineer officer and commanding general of the Persian Gulf Service Command, told me in August that we were hauling 5 times what we had been moving eight months ago and 11 times the tonnage that was hauled over the famed Burma Road in its peak month of operation.

U. S. supply corridor in Iran where American Engineers have developed and are operating transport facilities over which huge quantities of trucks, planes, war materials and food are moving to the Russian front.

The men of the Persian Gulf Service Command, who have made such a situation possible, deserve as much credit as any troops of the battlefield. They and their civilian predecessors and partners—American construction men and industrial technicians—have won "the Battle of the Persian Supply Corridor," which history may well record as one of the most important of this global war. And lest the designation "battle" be taken as mere sloganeering, like the "Battle of Production," it should be pointed out that neither our troops in New Guinea nor in North Africa encountered Nature in more fearsome mood than do the men in the deserts and mountains of Persia. They have worked in 150 deg. temperatures, in high humidities, in sandstorms, in ankle deep mud, suffered malaria, dysentery and the lonesomeness of isolation. They have died of thirst and they have been crushed to death under overturned trucks. They have accomplished a tremendous job, and the only thing that is "too little and too late" in this part of the world is distinguished service medals.

This story, written piecemeal during a two weeks trip through the Persian supply corridor, is devoted to the construction and civil engineering phases of the work. Justified as

at may be, considering the writer's terest and audience, it should be cognized that the facilities are only e means to an end. That end is be- g achieved by those of the Army nd there are many engineers and onstruction men among them) who erate the ports, trucks, trains, air- anes and assembly plants that make e Persian supply corridor a rip- aring action front that must be igh on the list of German headaches.

What is involved

The Persian supply corridor can be cated on any map by merely noting e straight line distance between the ead of the Persian Gulf in the vicin- y of Basra, Iraq, and the south end f the Caspian Sea, north of Tehran, an. It is about 700 miles long and cludes a rail line, a highway, and airline, together with ports and ruck and airplane assembly plants t the south end and transfer stations t the north end where the goods that re transported are taken over by the ussians.

Topographically and climatically, e Persian supply corridor is one of e wonders of the world. For the first 0 miles it is desolate desert, so flat at engineers have to think in terms f gradients of 6 in. to the mile, which , of course, a useless expenditure of erebral energy. Sizable rivers and kes occur amidst this aridity, and roundwater can be reached any- here, at shallow depths. Beyond the sert rise the Luristan and Elburz ountains, stringing chain upon ain of grotesquely folded and oded ranges running from north- est to southeast. Peaks of 12,000 ft. re common and one reaches to 18,- 0 ft. above sea level. The narrow at-floored valleys between these anges are usually at about 4,000 ft. evation, and are cultivated through e use of irrigation water from the elting snows and mountain springs. emperatures in the desert get up to 0 deg., and near the Gulf humidity high. Winter there is a time of tor- ential rains that turn the flat desert to a vast lake until evaporation and sorption dry it up. By contrast, inter in the mountains is accom- anied by heavy snows and tempera- res rivaling those characteristic of ussia.

Despite these formidable physical andicaps, Iran has been crossed by ansport routes for many hundreds f years. Alexander and Genghis

American-built port facilities at the head of the Persian Gulf represent the spigots on our supply lines to Russia. Top: A Liberty ship is unloaded at a deep-water pier. Center: Lighters bring supplies to a wharf from a ship anchored offshore. Bottom: The author, literally holding his hat, takes a ride in one of the amphibious "ducks" that bring first priority supplies from ship to shore.

Our Persian supply corridor in action. An American truck convoy carrying vital war supplies to Russia awaits the signal to start on the grueling 700-mile trip across the deserts and mountains of Iran.

Kahn and Marco Polo used them. Roman legions under Mark Anthony tried to take them over, failed, and stayed as prisoners to improve them. Still, for nearly 2000 years they remained little more than camel trails until the Shah of Iran decided that the railway and motor truck were here to stay, and that his country should have some. By 1938, he had completed an 800-mile railway from Bandar Shahpur on the Persian Gulf to Bandar Shah on the Caspian, and a 500 mile truck highway through the mountains to the west of the railway route.

These road and rail facilities, plus a wheel-track road across the desert and several poorly equipped ports on the Persian Gulf, constituted the Iran traffic system that the United States, in 1941, undertook to convert into a great delivery route to Russia's back door.

The railway, of standard gage, is one of the most spectacular in the world; its cost of one hundred million dollars or about $125,000 a mile being indicative of the difficulty of its construction. Rising from sea level to a height of over 7,200 ft., it contains spiralled switchbacks and curved tunnels, and yet has some grades of 2.8 percent. In one 120 mile stretch there are 132 tunnels in addition to many sidehill galleries that give protection against sliding rocks. The highway is hardly less spectacular, since it must cross practically the same type of terrain. It, too, climbs to 8000 ft. elevation where snow in deep, narrow cuts presents a major maintenance problem.

History of the Iran adventure

The Persian supply corridor is a product of our lend-lease policy, originating back in 1941 before we were actively in the war. Russia, having lost much of her industrial capacity to the Germans, was in dire need of supplies. The Black Sea, her front door, was blocked by German occupation of Greece. She could get supplies from the north through Murmansk, but German submarine activities threatened this source. Her Trans-Siberian R. R. did not have the capacity to bring sufficient food and war goods from her Pacific gateway, and besides our relations with Japan were too strained to make this supply route a good gamble. A back door delivery route via the Persian Gulf, Iran and the Caspian Sea was the only remaining solution.

Such a route, however, involved the physical difficulty of stepping up the efficiency of the transportation facilities in Iran, and the political dif-

Roadbuilding in the Persian desert is an elevating grader job, with a patrol grader and sheepsfoot rollers doing the shaping and compacting. Proper consolidation requires large amounts of water because of evaporation losses.

culty of getting a free rein to improve and operate them. Britain had long had a huge commercial stake in ran through the Anglo-Iranian Oil o., and was, in fact, in military control of most of the country, a step it ad taken to put down German fifth olumn activity. The Russians, however, had moved in at the same time nd occupied the northern part of ran bordering on the Caspian Sea. he two countries, although anxious o cooperate in winning the war, were uspicious of one another's motives in ran. Neither particularly wanted the ther to develop the supply route, and either was in any position to undertake the work anyway without U. S. id. The difficulties were resolved by aving the United States, through end-lease funds, do the development ork as well as provide the supplies.

Road to Russia in the making. Moistened with water from tank trucks, the desert silt—not sand—compacts into a good base for the asphalt surface.

What has been accomplished

The work was turned over to a newly-created Iranian Supply Mission composed chiefly of U. S. Army Engineers, and a contract was made with the American construction firms of Foley Brothers and Spencer, White and Prentis to build dock facilities and a 30-mile rail line across the desert to a connection with the existing mainline, and with General Motors and Douglas Aircraft for truck and plane assembly plants. Under trying conditions these companies made substantial progress throughout 1942, but early this year labor and equipment supply from the States became too difficult for a civilian set-up to handle, and the work was turned over to the Army, and the Persian Gulf Service Command organized.

P.G.S.C. is an outfit of specialists—construction engineers, sanitary engineers, architects, water supply experts, railway engineers, truck transport men, and port operators, to name some of them. What these men have accomplished under the leadership of such Army Engineer officers as Maj. Gen. Donald H. Connolly, Brig. Gen. Stanley L. Scott, his chief of staff, Brig. Gen. Don G. Shingler, director of the Motor Transport Service, Col. Paul F. Yount, director of the Military Railway Service, Col. Theodore M. Osborne, assistant chief of staff for operations, and the commanding officers of the Command's three districts, Colonels Francis H. Dryden, Donald P. Booth and Homer B. Pettit, will measure up with the achievements in any of the American theatres of war. Moreover, as bearing on the subject matter of this story, the civil engineering and construction aspects of these accomplishments are unusually interesting and instructive.

Ports with teak wood wharfs

Watching the 40-ton tower-mounted revolving cranes dipping into the holds of Liberty ships moored bow to stern beside one of the long deepwater wharfs or a 100-ton guy derrick lifting a locomotive from a lighter at a shallow-draft pier, it is difficult to appreciate that all of this port development is a product of the last 18 months. It is also difficult to realize that it was an American contractor and civilian construction men who came to this malaria-laden waste land at the head of the Persian Gulf and created these great ports with their bare hands and what little

Holes dug almost anywhere on the arid Persian desert yield water for the roadbase stabilization work. Of these distributor trucks being loaded, the last in line carries a 12-yd. dump body converted into a tank by welding.

Floods, as well as heat, sand and wind, complicate desert road maintenance in Iran. This flood of last spring made it necessary for the Army Engineers to rebuild 30 miles of road and replace all of the bridges.

equipment they could bring across a dangerous 13,000 mile sea route from the U. S. But this important episode in the construction history should not be forgotten, for the ports are the heart that furnishes the blood to the Persian supply arteries.

The principal construction problems at the ports consisted in building pile-supported wharfs parallel to the shore and connected thereto by pile trestles for rail and truck access; in erecting the unloading cranes; and in building bulkheads at other locations along the shore to support landing platforms for barges that bring material from ships anchored out in the bay. Significant facts about this early construction phase are scarce, but it is interesting to note that all of the piles are of teakwood brought from India and that they were driven under a specification that required 3 blows to the last *foot* of penetration. Since the pile might sink 5 ft. under its own weight when set on the soft, bottomless silt at the port locations, this specification is not as liberal as it seems. Furthermore, after being driven to grade and allowed to remain undisturbed for 72 hr. or so, the piles resisted further driving quite effectively. The silt apparently has the capacity for tenacious bond with the teakwood even though it has absolutely no bearing power. The piles at the P.G.S.C. ports, therefore, support their loads entirely through friction.

Roadbuilding in desert and mountain

The Persian desert must have been the ideal spot that the inventor of the elevating grader envisioned for the most efficient application of his machine. Absolutely flat, and consisting of a rock-and-root-free silty soil that cuts readily, but does not cave, the Persian desert permits the elevating grader to make short work of roadbuilding when supplemented by a motor patrol grader to spread the discharge from the belt, water distributor trucks to moisten it and sheepsfoot rollers to compact it.

The specifications to which P.G.S.C. roads are now built provide for a 30-ft. wide embankment, raised 18 in. above the desert floor and surfaced with a 24-ft. wide, 3 in. thick sand (silt)-asphalt wearing surface. Side ditches have a 6:1 fore slope and a 4:1 back slope. The purpose in raising the road above the desert floor and in providing ample side ditches is to protect it from the spring floods which turn the whole area into a vast lake.

On one of these desert jobs, under way in August, the Army Engineers were using three fully-equipped outfits, spaced about 2 miles apart. The grade was built up in three 6-in. lifts, each well watered and compacted. All four pieces of equipment in each outfit moved along almost as a close-coupled unit, first the tractor-hauled elevating grader in the ditch, then the motor patrol grader on the subgrade, next a water distributor truck and finally the tractor-hauled sheepsfoot rollers. After the first pass, the subgrade was subjected to additional watering and rolling, and then the second lift was begun.

It might be thought that water supply would present a problem in the desert, but in general it is only necessary to dig a pit from 5 to 15 ft. deep with a crawler-mounted clamshell; the water table is seldom deeper than that. Diaphragm pumps at these pits load the water distributor trucks. On this particular job, it was also possible to supplement the

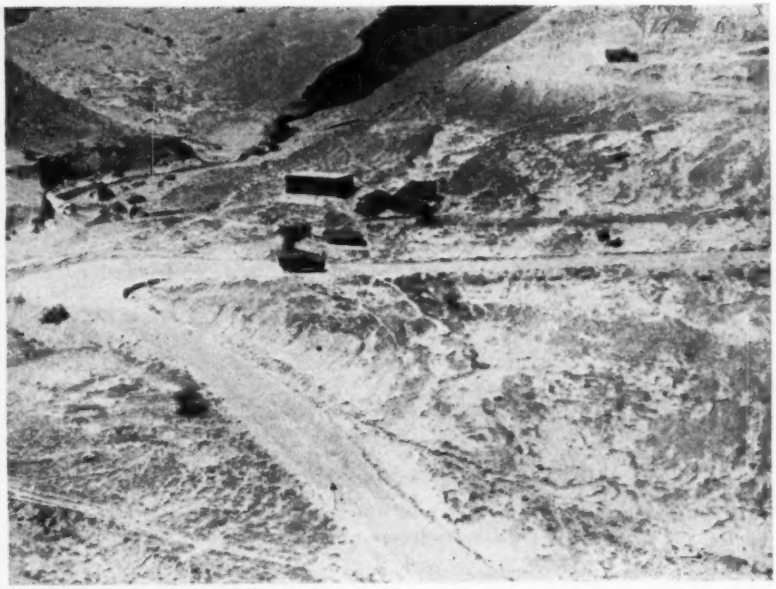
groundwater pits with water holes ed by ditches dug to nearby tide-water. The water trucks are 1500-gal. capacity, but on this job those available did not provide sufficient volume, and a number of 12-yd. dump trucks were welded into 2400-gal. water-carrying tanks. The total water truck capacity thus provided was 18,000 gal.

Adding water to the subgrade is done by rule of thumb. Because of varying evaporation, depending on temperature and humidity conditions, and because there is neither the time nor the necessity for building a scientifically compacted road, no soil tests are made. Considering the huge truck traffic that the roads carry without excessive maintenance, other than to repair the surface, the results have been deemed satisfactory.

The final roadbuilding operations consist of surfacing by mixed-in-place methods and of ditch cleaning with the use of a tractor-hauled 8-yd. carrying scraper. An MC-2 type cutback is the oil used. An 8-ton three wheeled roller is used to compact the surface.

The above brief description of the desert roadbuilding job that has been done sounds much simpler than it actually was. What has been described is the procedure that has been evolved after many trials and tribulations, and has actually so far only been applied to a 25 mile stretch of what might be termed side road. The 180-mile main stem from the Persian Gulf north to the mountains was where the trials and tribulations were experienced. Many of them are interesting and instructive.

The desert road was started by the contractor and completed by the Army Engineers. Because the contractor came equipped only to build ports and railway trackage (the highway being added later) and because a shipload of his supplies was misdirected he lacked the sheepsfoot rollers, tank trucks and some other equipment necessary to build a good desert road. The one that was built with elevating graders, bulldozers and scrapers was subjected to an unusual rainy season before the oil-penetration gravel surfacing could be completed, and the base became soaked. Repair methods instituted by the Army Engineers consisted in removing the gravel surfacing, drying out the subgrade by blading as deeply as possible and aerating, and then re-



Over 400 miles of the Russian supply road traverses the arid mountains of northern Iran, much of the route following a serpentine alignment, as in the top view, in order to climb from sea level to an elevation of 8,000 ft. (Bottom) Widening of cuts and curves constitutes the current mountain road-building job of our Army Engineers and their native labor gangs.

compacting with some sheepsfoot rollers borrowed from the British. The 6-in. gravel surface was then replaced and sealed with a one-shot treatment of $\frac{3}{4}$ gal. of oil per sq.ft. and surfaced with an armour coat of MC-2 type cutback covered with pea gravel. This 70-mile stretch of road has stood up remarkably well under the pounding of some 1,000 trucks every 24 hr.

Another 30-mile stretch was originally surfaced with a sandstone, which proceeded to pulverize under traffic. The remedy here was to mix the pulverized material in place with the cutback oil and to roll thoroughly.

Finally, on a third section 60 miles long, the top 9 in. of the fill was scarified, watered and compacted with sheepsfoot rollers to form a solid "roof" over the loose fill, upon which a 2-in. sand-asphalt surface was applied. The Army Engineers admit this is very thin compared with the mats usually used in the States, but time was not available for any better construction. However, reasonable success with this thin mat, where a good compacted base exists, has

Persian laborers prefer their own primitive equipment. The "platform", leaning against the rock, and the wooden-wheeled cart take the place of wheelbarrows.

caused them to increase it only to 3 in. on later work.

It was while placing this 2-in. mat on the last 30 miles at the southern end of the road that the Engineers experienced their worst and most unexpected difficulty in the form of a flood on the desert; one day the job was in a dust bowl and 24 hr. later it was merely a causeway across a lake 17 miles long and 15 miles wide caused by the overflow of a nearby river. Wind-created waves 3 ft. high beat against the road, washing out 5 miles of it completely, damaging the rest and wrecking most of the culverts, which were not equal to acting as pressure conduits. Nor did the flood pass quickly, since there was no place for it to go. One fair-size lake was blown around the desert by the wind, just like a bubble on glass, darting in frequently to inflict more damage. A continuous 24-hr. fight to confine it in a dike was unsuccessful, and it was finally necessary to wait until it blew away and evaporated. The entire 30 mile stretch had to be rebuilt.

Levee will protect road from floods

Although the flood is said to have been the worst in 20 yr., the Engineers are taking no chances, and are building a levee between their road and the river so that next spring's floods, however big, will pass them by. This levee, about 8 ft. high and 3 miles long, is some distance from the river so that the natives are not quite sure whether it is another road or some new kind of fortification that these crazy Americans are building.

The most useful lessons learned from the desert highway building in Persia is that the silty material, at least 50 percent of which will pass a 200 mesh sieve, and whose optimum moisture content is about 12 percent, can be compacted readily by sheepsfoot rollers, if thin layers are used. Further, that since evaporation losses are high, it is advisable to use water liberally.

It has been found that, given a firm base, a 3-in. sand-asphalt mat provides a satisfactory surface for heavy truck traffic. The best way to build it is to prime the earth with 0.5 to 0.75 gal. per sq.yd. of MC-2 oil to provide a working table on which to mix the sand-asphalt (which should be thoroughly aerated to release the volatiles) and then to seal the mat with 0.2 gal. per sq.yd. All of this adds up to about 8 percent asphalt by dry weight, or 30,000 gal. per mile of 24-ft. wide roadway. Nearly 2½ million gal. of asphalt has been used on 79 miles of road. In one 24-hr. period a single traveling mixing plant used 96,000 gal., which is record-type performance in any country.

On June 15, the engineers took over from the British maintenance responsibility on the 500 mile mountain section of the highway. The way

Two bottlenecks, one ancient and one modern, on the mountain section of the Persian supply corridor. Left: The road passes through an arch of a bridge said to have been built by Alexander over 2,000 years ago. Right: A one-way tunnel, typical of many that create danger and delay.

ings have been going since. this
intenance will result in the virtual
building of this spectacular road.
present 2400 natives under En-
neer supervision are eliminating
azardous curves and bridges, widen-
g sidehill cuts on a 40-mile section
d getting a smooth surface wher-
er needed. A prime coat plus an
sphalt armour coat, using pea gravel,
most favored since sand-asphalt
ill not stand the freezing and thaw-
g that is common in this area. For
considerable distance, the road
averses a pass at 8,000 ft. elevation,
d since much of this is in deep,
arrow cut, one of the jobs is to
iden these cuts so that they can be
ept free of snow this winter.

The present story of the mountain
ighway is best told by the pictures
at accompany this article.

This spot where a mountain spring crosses the convoy road has now been paved with asphalt-grouted stone so that the trucks ford instead of detouring it as the one shown at the left in the picture is doing.

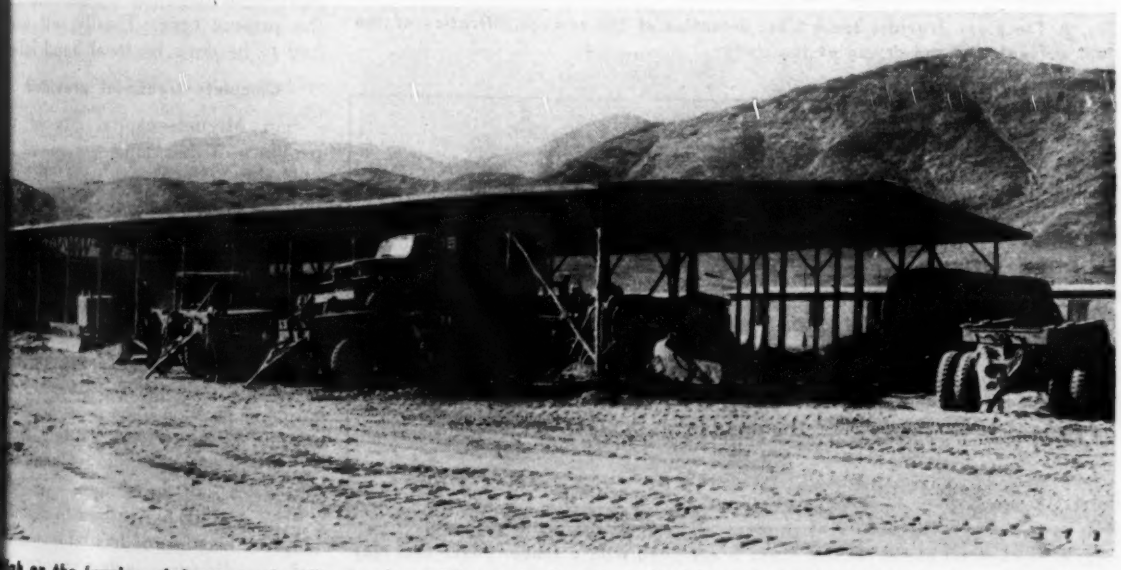
Equipment exceeded expectations

A word should be said about the
nstruction equipment that has
ade this roadbuilding job possible.
a word, it has exceeded expecta-
ons. Numerous extra treads for
awler machines were on hand, but
o replacements were required on the
esert work, because the silty material
id not prove to be abrasive. Belts
n the elevating graders also lasted a
ng time. In contrast, the desert
eat was death to generators, storage
atteries and pumps. The mountain
ork will probably reverse these con-
itions.

Rubber tires of course take a beat-
g both in the desert and the mountains. But the fact is that at no time did the writer hear anything but praise for the tractors, elevating graders, motor patrol graders, power shovels, trucks, asphalt distributors and rollers that have done so much to make the Persian supply corridor a successful venture.

General Connolly recently said that the directives of the combined chiefs of staff to the Persian Gulf Service Command can be summed up in three words—Aid to Russia. In a period of eight months, since the first American troops arrived, this aid has been mounting until supplies are going to the Russian Army as fast as and frequently faster than it is able to take them away. The construction work of the Army Engineers has been the basic and often the controlling factor in making this success possible. It is a success that all Americans, and particularly civil engineers and construction men, can regard with great satisfaction and pride. In beating a path to Russia's back door over which the materials of victory are now rolling, the Army Engineers have added another achievement to their long list of accomplishments.

Editor's Note—A concluding chapter of this story, covering Army Engineer building practices in the Persian supply corridor, will be published in the November 4, issue.



gh on the Iranian plateau construction equipment is repaired and serviced in a shed built of baily poles, peeled trunks d branches of a native tree that resembles a cottonwood.

ENGINEERING ABROAD — AS SEEN BY ENR EDITORS

Treatment Plant Built of Local Materials

A. N. Carter
Assistant Editor, Engineering News-Record

***Contents in Brief**—A low-cost El Salvador sewage treatment plant was constructed with a minimum of imported and critical materials. The end walls of the settling tanks are of masonry and the side walls were built of precast concrete slabs without reinforcing. The filter beds have masonry walls and the distribution and under drainage systems were built of tile burned locally. Volcanic material mined nearby was used for filter stone.*

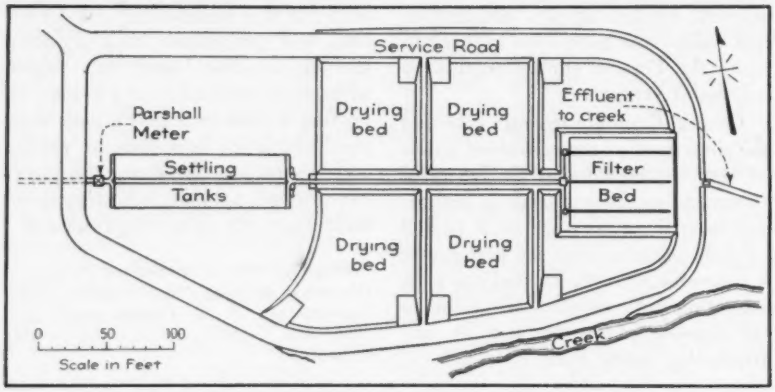


Fig. 1. The plant provides for a 3-hr. detention of the sewage, filtration of the tank effluent, and sun drying of the sludge.

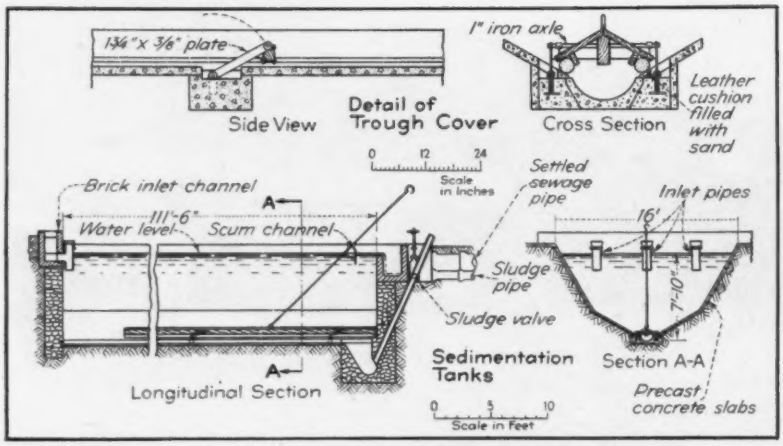


Fig. 2. The bottom of the settling tanks is equipped with a timber cover that may be raised manually section by section to provide for the hydraulic discharge of the settled sludge.

ONE OF THE MOST INTERESTING sanitary projects carried out to date in Central America under the supervision of the Office of the Coordinator of Inter-American Affairs is the sewage treatment plant constructed at San Miguel, El Salvador. This project is particularly noteworthy because of the construction methods followed to achieve low cost and to permit use of local materials. Another distinguishing feature of the work is that it marks an attempt to develop a type of plant that can be built within the financial capacity of the many Central American cities needing treatment facilities. And in addition to the major requirement that the plant be of low cost and of simple operation, the designers had to contend with the impossibility of getting pumps and other mechanical equipment from the United States at the present time. Finally, all work had to be done by local hand labor.

Complete treatment provided

San Miguel—capital city of the province of that name—is one of the oldest cities in El Salvador. It has a population of about 17,000, and treatment was to be provided for the sewage from the greater part of the city.

The facilities constructed are illustrated by Fig. 1 and the accompanying photographs. They are designed for a per capita flow of 60 gal. per day and provide for a 3-hr. detention of the sewage in two settling tanks, filtration of the liquid effluent, and sun drying of the sludge.

The settling basins had to be made shallow because of local topographical conditions, including an extremely high groundwater table and

Fig. 3. On construction of the settling basins the native laborers did excellent work. The drying beds and the stone filter are shown in background.

lava subsoil. The basins are 111 ft. 6 in. in length and of V-shaped cross section, being of 16-ft. maximum width and providing for a water depth of 7 ft. 10 in. At first, the sidewalls of the tanks were lined with precast concrete slabs without reinforcing, the blocks being manufactured nearby, but when cement became a critical material, kiln-baked, clay sections laid in mortar were substituted. Both linings proved highly satisfactory. The end walls are of masonry.

Flow into the intake channel at the end of the tanks is measured by means of a Parshall meter installed in a small but sturdy house with masonry walls and tile roof. Discharge from the channel to the tanks is underwater through vertical concrete pipes, as shown by Fig. 5. Flow into one basin at a time or both reservoirs simultaneously is possible.

Discharge of effluent is automatic

Discharge of the liquid effluent from the basin is via an automatic siphon and a 24-in. dia. concrete pipe about 200 ft. long leading to a 59 x 90-ft. stone filter 6 ft. 6 in. deep. The filter stone, which is graded from ¾ to 2½ in. in dia., is lava material mined locally. This stone presents a much larger surface area per unit volume than most rock. Thus, the bed was designed for a high rate of discharge, only 1 cu. meter (1.3 cu. yd.) of crushed stone being provided for every 25 persons.

The distribution of the effluent over the trickling filter is by means of three parallel lines of 8-in. dia. precast concrete pipe discharging into transverse lines of curved clay tile sections (about one-third of a circle in shape) on 2-ft. centers (Fig. 7). Flow from the 8-in. pipe is through small holes near the bottom at either side where the pipe crosses the transverse lines of tile.

Underdrainage for the filter bed consists of a floor built of open-joint tile burned locally. The effluent from the filter passes to a nearby stream.

Sludge accumulating in the bottom of the settling tanks is discharged to four drying beds, each 72 x 82 ft. in plan. For experimental purposes each bed was built differently. The four types are: (1) A solid pavement of hollow clay tile manufactured locally; (2) open-joint under-drains covered with sand; (3) sand without underdrains; (4) local porous earth free of under-drains. The plant has not been in operation sufficiently long to determine which type is best. After the sludge is dried it is hauled away by a neighboring landowner to be used for fertilizer.

Fig. 5. Installing the timber covers at the bottom of a settling tank. Progressive removal of the covers fosters hydraulic discharge of the settled sludge to the drying beds.

Sludge discharged by unusual method

The arrangement to permit gravity flow of the sludge from the tanks to the beds is one of the most unusual features of the plant. The trough at the bottom of each tank is equipped with a timber cover of the type illustrated by Figs. 2 and 4. The sludge is discharged hydraulically to the drying beds by opening the control valve shown in Fig. 2 and raising the cover manually section by section.

The most satisfactory discharge procedure results if the cover sections are raised progressively from the intake end of the settling tank. By this procedure the remaining sludge creates a tight seal between the bottom of the tank and those sections of the cover not yet raised.

After the sludge leaves the siphon it flows through one of two 8-in. dia. concrete pipes for a short distance and then along one of two parallel gutters, one on either side of the liquid effluent pipe (Fig. 6). Flow onto the drying beds is by overflow from the gutters.

Operation of the plant requires the work of one laborer. Daily he cleans the walls of the precipitation tanks

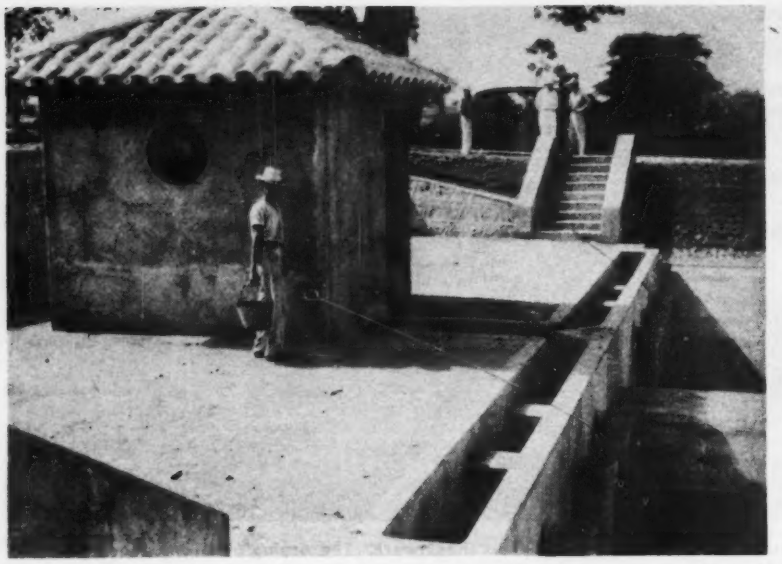


Fig. 4. Flow to plant is controlled by a Parshall meter housed in the small structure at the left. Discharge from inlet channel to the settling tanks is underwater through the six vertical pipes shown at the right.

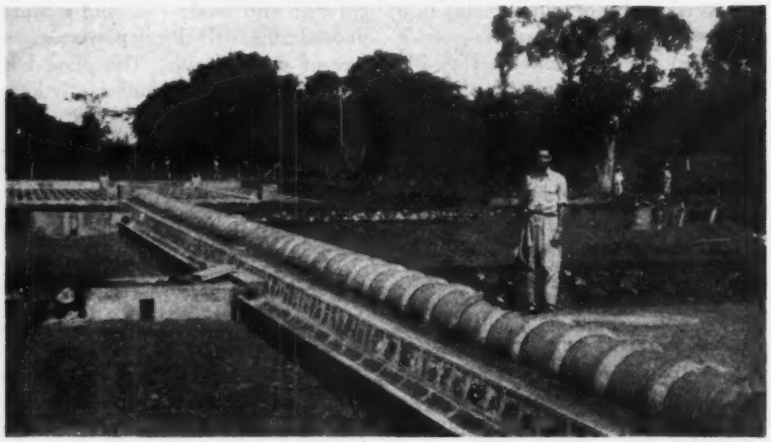


Fig. 6. Transfer of the sludge to the drying beds is by overflow from two masonry gutters, one on either side of large pipe leading to stone filter in the background.

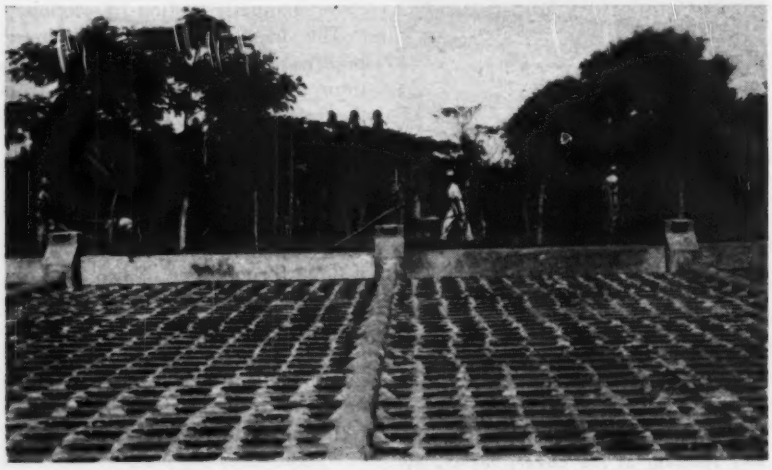


Fig. 7. Open tile conduits of type above provide for the distribution of the liquid effluent over the trickling filter.

of settled sludge and then removes the accumulated settlings at the bottom of the tanks. He also sees that the sludge is removed from the drying beds after it has been exposed two or three days.

Operating experience to date

The treatment facilities operate under tropical conditions, the temperature at San Miguel often reaching 100 deg. F. The plant has been in service five months, and to date has caused no appreciable odor, no fly development from the sludge beds, few filter flies, and no attraction to zopilotes (local vultures). At the same time the effluent has been of good quality.

Col. H. W. Van Hovenberg, chief of the Institute of Inter-American Affairs field party in El Salvador and lieutenant colonel in the U. S. Army, considers the plant a successful low-cost experiment. However, Colonel Van Hovenberg, who determined the type of treatment to be used and conceived the general plant design, has recommended that similar plants not be built until the facilities described have been in operation for a longer period. Atilio Garcia Prieto, local El Salvador engineer entrusted with the detailed design and execution of the construction, considers the operation entirely satisfactory. Both men point out that if the treatment facilities prove less satisfactory than now anticipated, it will be possible to convert the settling basins into modified Imhoff tanks or operate them as septic tanks. In the latter case the sludge would be withdrawn two or three times yearly.

Cost of the plant, together with all piping, driveways, and beautification, was about $6,000 (American money) or roughly $0.35 per capita of the population for which treatment facilities were to be provided. The cost was divided about evenly between the city and the Coordinator's Office.

Construction of the plant required six months, and native hand labor was used almost exclusively, 850 men being employed at the peak of operations. The workmen proved industrious, and almost every man was a good mason. Their work was of excellent quality.

Harold B. Gotaas, chief of the engineering section, division of health and sanitation, Coordinator of Inter-American Affairs, was in general charge of the engineering work.

Spacing of Split-Ring Timber Connectors

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***ntents in Brief**—Comprehensive loading tests made on timber con-tors whose axes are neither parallel nor perpendicular to the grain of the nected timbers provide data that will enable engineers to calculate urately the spacing of connectors. Loads were applied at angles ranging m 0 to 90 deg. to the grain while the axes of the pairs of connectors ied from parallel to perpendicular to the grain to cover most conditions with in design. The procedure here recommended for determining spac- of timber connectors should clarify a number of questions often raised designers, and the data contained in the accompanying charts and tables result in more economical designs which can be made faster and easier.*

E PROPER SPACING of pairs of mod- timber connectors when their s are parallel or perpendicular to grain of the timber in which they embedded has been established by and is generally accepted prac-. This is particularly true of con-tor pairs loaded so that they bear allel or perpendicular to the grain. Less data have been made available ereby proper spacing of pairs of nectors whose axes are neither allel nor perpendicular to the grain be determined, especially when direction of the load also is neither allel nor perpendicular to the in. Strict interpretation of present cing recommendations requires a r of 4-in. split rings, for instance, ded at 0 to 30 deg. to the grain, e 9 in. apart in projection paral- to the grain until their projection pendicular to the grain is $5\frac{1}{2}$ in. n they can be spaced only $5\frac{1}{2}$ in. rt. This sudden shift from a center center distance greater than 9 in. distance of $5\frac{1}{2}$ in. is too conserva-. Furthermore, there is an abrupt k in the required spacings paral- and perpendicular to the grain as angle of load to grain changes m less than to greater than 30 deg. s also appears illogical.

his situation has needed clarify- particularly in view of the use by y engineers of increased stresses, h in timber and in connectors. ecially in need of study was the proper spacing of rings spaced neither parallel nor perpendicular to the grain and loaded at appreciable angles to the grain. Consequently, to develop recommendations for spacings of ring pairs whose axes vary from parallel to perpendicular to the grain, and which are loaded at any angle from 0 to 90 deg., a joint research was undertaken by the Timber Engineering Co. of Washington, D. C., and the Department of Building Engineering and Construction of the Massachusetts Institute of Technology. Tests were carried out at M.I.T.

Tested three species of timber

Connectors chosen were $2\frac{1}{2}$-in. and 4-in. split rings since these are the

Timber Engineering Co. Photo

Fig. 1. Correct spacing of split-ring timber connectors aids fabrication on the job. Here the channels are being cut into which the rings will fit.

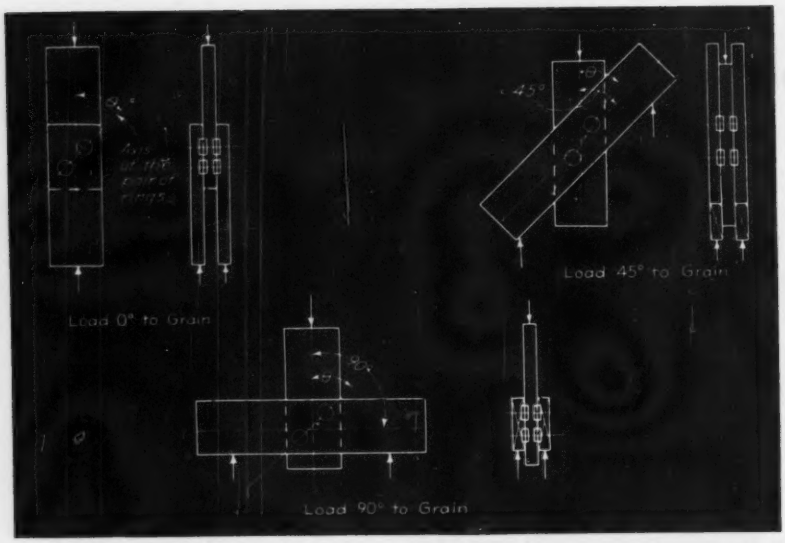


Fig. 2. Test specimens were made up of three timbers connected by a pair of rings in each inter-face, making four rings in all. Loads were applied to the center member while side members were oriented through various angles.

most commonly employed types. Bolts were standard ½-in. machine bolts with 2-in. sq. washers, and ¾-in. machine bolts with 3-in. sq. washers.

Three species of timber were employed, taken from and corresponding to the three groups of structural species for which recommended loads are given. They are:

Group A	Dense southern pine
Group B	Douglas fir (non-dense)
Group C	Redwood.

The most exhaustive tests were made on Douglas fir, because it represented the intermediate Group B species most commonly employed. Check tests were made on dense southern pine and redwood.

Assemblage of test specimens

Test assemblages consisted of two side members and a single center member as shown in Fig. 2. Members were either $1\frac{5}{8}$ in. or $2\frac{5}{8}$ in. thick, depending upon size of ring and whether rings were in one face or two faces. Two rings were placed in each interface, making four rings in all.

Loads were applied to the center member, and side members were oriented at 0, 45 or 90 deg. to the center member. Loads were applied continuously at the rate of 0.05 in. per min. Note was made of the first serious cracking and slip, and of the maximum load sustained by the assemblage. In general, three tests were made at each point although in some instances the number was increased.

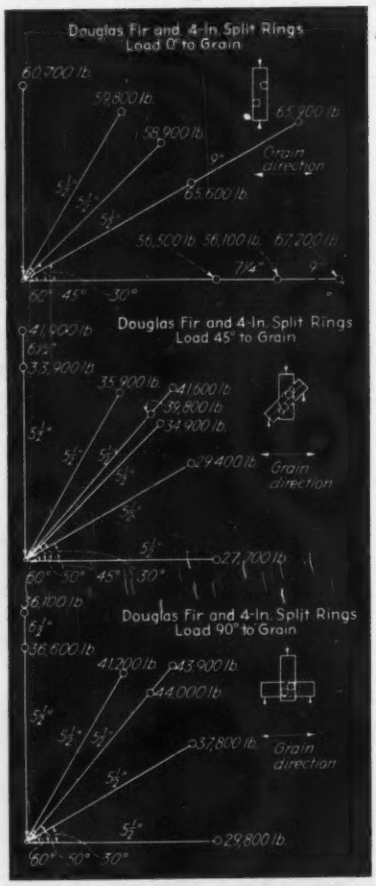


Fig. 3. Three conditions of load application were tested. Load was applied parallel to grain (top), at 45 deg. to grain (center), and perpendicular to grain (bottom). Connector axes are at various angles with the grain, with the corresponding values of the connections noted on the charts.

Test values were corrected to 12 percent moisture content and to the following specific gravities:

Dense southern pine	0.58
Douglas fir	0.48
Redwood	0.42

Ring connector spacing

Douglas fir was tested first, and to provide bases of comparison, tests were first made with ring axes parallel and perpendicular to the grain, at both standard and reduced spacings to find the rate at which such reductions affected the strength. Ring axes were then oriented at various angles to the grain of the members, as shown schematically in Fig. 2 (angle θ) and rings were spaced varying distances apart so as to obtain a number of points from which curves of average equal load capacity could be drawn.

Using the Douglas fir results as guides, check tests were then made on dense southern pine and on redwood at 0-, 45- and 90-deg. angles of ring axis to grain, and at 0-, 45- and 90-deg. loadings.

Results of test

Three typical sets of points, for 4-in. split rings in Douglas fir, are shown in Fig. 3. The small circles represent ring centers, and the figures are average corrected test results.

An examination of these figures shows that the 5½-in. spacing in general yields satisfactory results for all angles of load to grain when ring axes are oriented at 38 deg. or more to the grain, but that results fall off for the spacing below 38 deg. Consequently, spacings must be increased as the ring axes become nearly parallel to the grain, or allowable load per ring must be reduced.

Failure, when ring axes are approximately parallel to the grain, is caused principally by cracking between rings. When the ring axes form appreciable angles with the grain, failure occurs primarily by crushing of the wood fibers around the rings.

The results shown in Fig. 3 are typical of the entire series of tests for both 2½-in. and 4-in. rings, and for the three species. The findings may be summarized as follows:

1. Spacing along ring axes parallel to grain is generally more critical than perpendicular or at an appreciable angle, particularly when the rings bear at a large angle to the grain.

2. As the ring axes deviate from position parallel to the grain, the ad-carrying capacity picks up rather arkedly and reaches its full value en rings are spaced apart, perpen-ular to the grain, a distance ap-ximately equal to the ring di-eter.

3. Intermediate spacings (axes an-s intermediate between 0 and 90 g.) can be made much less than ct interpretation of present rec-mendations requires, but should proach the present recommenda-as as the ring axes approach the and 90-deg. positions.

Ring-spacing formula

As a consequence of these tests and foregoing observations, it is rec-mended that pairs of timber con-tors be spaced in accordance with formula for an ellipse, which is en below.

$$r = \frac{ab}{\sqrt{a^2 \sin^2\theta + b^2 \cos^2\theta}}$$

which

= spacing measured center to center of rings, with one ring at the center of the ellipse and the other on the periphery.

= spacing parallel to grain.

= spacing perpendicular to grain.

= angle of axis of rings to grain.

Explanation of formula

The values of a and b depend upon angle of load to grain. As that le increases, a becomes smaller b larger, until 60- to 90-deg. load-is reached. If the allowable load ring is reduced to 75 percent, the cing is the same for all orienta-s of ring axes (angle θ) and all les of load to grain. This spacing, also minimum.

When the centers of several con-tors are not offset from each other, pendicular to the grain, a distance ater than the connector diameter, the connectors bear at 45 to 90 to the grain, the maximum al-able load for the group of con-tors may not exceed the allowable for one connector multiplied by percentages given in Table II, or, course, it may not exceed the sum the allowable loads for the indi-al connectors. This limitation lies to the connectors all in one , or to connectors divided between faces of a piece, when the con-tors are all loaded in the same ction.

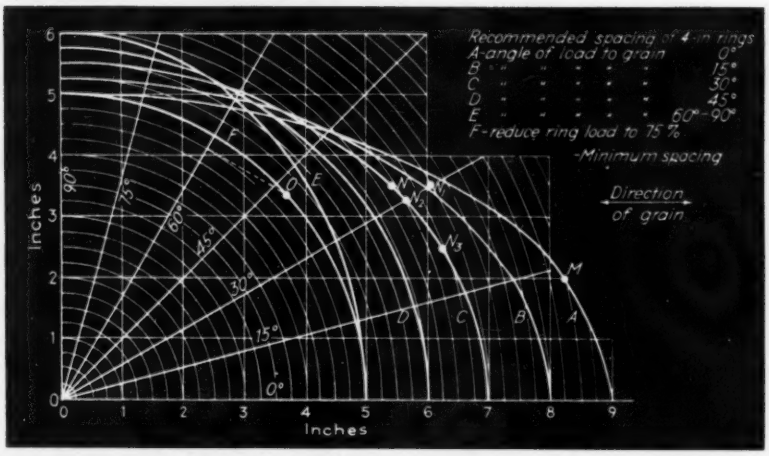


Fig. 4. Comprehensive tests of various load applications and spacing of connectors resulted in a number of values from which curves of average equal load capacity were drawn. From these tests it is recommended that spacing of pairs of timber connectors should be calculated in accordance with the formula for an ellipse as noted in this article.

The percentages of allowable loads for spacings less than those giving maximum load are determined by straight line interpolation between the spacing for 100 percent load and the spacing for 75 percent load.

Values of a, b and c for all types of connectors are listed in Table I. The complete set of curves for 4-in. split rings is given in Fig. 4.

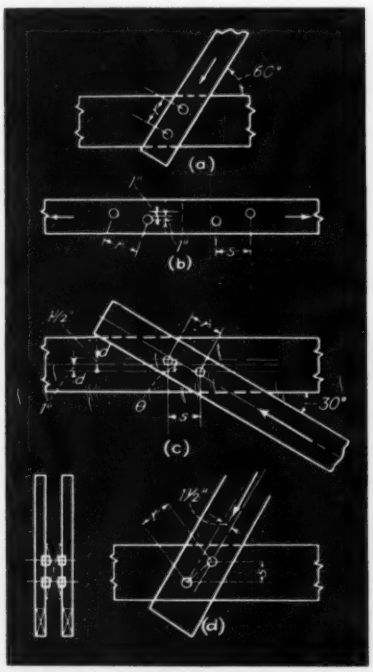


Fig. 5. The ease and rapidity with which proper ring-spacings can be calculated are clearly demonstrated in these four typical cases. Spacing of connectors parallel to their axes, as well as the spacing both parallel and perpendicular to the grain of the timber, are determined from Fig. 4.

As an example, suppose it is required to find the spacing of a pair of 4-in. split rings in the center member of the assemblage shown in Fig. 5a. Referring to Fig. 4, the spacing r is found by measuring along the 60-deg. line to the curve E. The spacing is $5\frac{3}{4}$ in.

As a second example, suppose the 4-in. rings in the splice plate shown in Fig. 5b are 1-in. off the center line, as indicated. The distance r center to center, or the distance s (projection along the grain) is required. In this instance the load is parallel to the grain and gage lines are 2 in. apart. Measuring up 2 in. from the base line in Fig. 4, and out to ellipse A (point M), the distance r is found to be $8\frac{1}{2}$ in., and the distance s is $8\frac{1}{4}$ in.

As a third example, suppose two members intersect as shown in Fig. 5c. The spacing center to center of rings r or projection parallel to grain s is wanted. In this instance the load is applied at 30 deg. to the grain. The gage lines d-d are $3\frac{1}{2}$ in. apart. Measuring up $3\frac{1}{2}$ in. from the base line on Fig. 4 and out to ellipse C (point N), the required spacing r is found to be $6\frac{1}{2}$ in., and the distance s is $5\frac{3}{4}$ in.

Inasmuch as the line from the center to N makes an angle greater than 30 deg., corresponding to angle θ in Fig. 5c, the two rings can actually be spaced along the center line of the diagonal A and their spacing can either be 7 in. (point N_1, Fig. 4), or

TABLE I. PERMISSIBLE SPACINGS OF CONNECTOR RINGS

Spacings are given both parallel and perpendicular to the grain of the timber in columns *a* and *b*, respectively. Column *c* lists permissible spacings for all orientations of ring axes and all angles of load to grain (when load per connector is reduced to 75 percent of full allowable).

Type and size of connector	Angle of load to grain (deg.)	a (In.)	b (In.)	c (In.) (75% value)
2 1/2 in. split ring or 2 5/8 in. shear plate	0	6 3/4	3 1/2	3 1/2
	15	6	3 3/4	3 1/2
	30	5 1/8	3 7/8	3 1/2
	45	4 1/4	4 1/8	3 1/2
	60/90	3 1/2	4 1/4	3 1/2
4 in. split ring or 4 in. shear plate	0	9	5	5
	15	8	5 1/4	5
	30	7	5 1/2	5
	45	6	5 3/4	5
	60–90	5	6	5
2 in. toothed ring	0	4	2 1/2	2 1/2
	15	3 5/8	2 5/8	2 1/2
	30	3 1/4	2 3/4	2 1/2
	45	2 7/8	2 7/8	2 1/2
	60–90	2 1/2	3	2 1/2
2 5/8 in. toothed ring	0	5 1/4	3 1/8	3 1/8
	15	4 3/4	3 3/8	3 1/8
	30	4 1/4	3 1/2	3 1/8
	45	3 3/4	3 5/8	3 1/8
	60–90	3 1/8	3 3/4	3 1/8
3 3/8 in. toothed ring	0	6 3/4	3 7/8	3 7/8
	15	6	4 1/4	3 7/8
	30	5 1/4	4 1/2	3 7/8
	45	4 1/2	4 3/4	3 7/8
	60–90	3 7/8	5	3 7/8
4 in. toothed ring	0	8	4 1/2	4 1/2
	15	7 1/8	4 3/4	4 1/2
	30	6 1/4	5 1/8	4 1/2
	45	5 3/8	5 3/8	4 1/2
	60–90	4 1/2	5 3/4	4 1/2
2 5/8 in. claw plate	0	7	3 1/8	3 1/8
	15	6	3 1/4	3 1/8
	30	5	3 1/2	3 1/8
	45	4	3 3/4	3 1/8
	60–90	3 1/8	4	3 1/8
3 1/8 in. claw plate	0	7 3/4	3 5/8	3 5/8
	15	6 3/4	4	3 5/8
	30	5 3/4	4 1/4	3 5/8
	45	4 3/4	4 5/8	3 5/8
	60–90	3 5/8	4 7/8	3 5/8
4 in. claw plate	0	9	4 1/2	4 1/2
	15	7 7/8	4 3/4	4 1/2
	30	6 3/4	5 1/8	4 1/2
	45	5 5/8	5 3/8	4 1/2
	60–90	4 1/2	5 3/4	4 1/2

TABLE II—MAXIMUM ALLOWABLE LOADS FOR FOUR OR LESS THAN FOUR TIMBER CONNECTORS

The maximum allowable loads are shown in percent, based on the allowable load for one connector.

Type and size of connectors	Thickness of loaded member, inches: 1 5/8 (%)	2 (%)	2 5/8 (%)	3 and thicker (%)
2 1/2 in. split ring or 2 5/8 in. shear plate	300	300	300	300
4 in. split ring or 4 in. shear plate	230	248	269	300
2 in. toothed ring	300	300	300	300
2 5/8 in. toothed ring	300	300	300	300
3 3/8 in. toothed ring	300	300	300	300
4 in. toothed ring	225	250	300	300
2 5/8 in. claw plate	*	300	300	300
3 1/8 in. claw plate	*	250	300	300
4 in. claw plate	*	248	269	300

(*) Not permitted in this thickness.

For each additional connector over the four connectors, add 33 percent of the allowable load for one connector.

the distance between gage lines *d-d* on *B* can be reduced to 3¼ in. (point N_2). If the distance between gage lines is less than 3¼ in., the two rings must be moved off the center line of *A*. For instance, if the gage-line distance *d-d* is reduced to 2½ in., point N shifts to N_3, and the rings must be placed 1 in. off the center line of *A* (perpendicular distance from the 30 deg. axes to point N_3) and rings are on opposite sides of the center line of *A*.

It should be noted that spacing parallel to grain of the diagonal member may be the controlling factor. In this example, for instance, the 6½-in. spacing parallel to the grain of the diagonal (Point N_2) does not develop the full allowable load per ring at 30 deg. to the grain. Point N_1, calling for a spacing of 7 in., does fulfill this requirement, as does N_3.

As a final example, suppose two side members intersect a center member 2⅝ in. thick at 60 deg. as shown in Fig. 5d. Four rings are involved, all acting at 60 deg. to the center member. The spacing *r*, and the projection *s* are wanted. Since the angle of load to grain is greater than 60 deg., Table II indicates that the allowable load for four rings is 269 percent of the allowable for one ring, or each ring carries only 67 percent of what one ring alone could carry. Since this is less than 75 percent, the spacing *r* can be only 5 in. (Curve *F*, Fig. 4). Projecting a perpendicular 1½ in. line from the 60 deg. line on Fig. 4 to Curve *F*, point *O* is found 3⅜ in. from the base line. The distance *s*, therefore, is 3⅜ in.

Those who gave valuable assistance

The recommended percentages of Table II are largely based upon work performed at the Forest Products Laboratory; L. J. Markwardt and John Scholten of the laboratory were freely consulted, as was the late John Newlin. Moreover, sincere appreciation is expressed for the assistance of numerous individuals. Chester Hogue of the West Coast Lumberman's Association proposed a series of basic spacing charts. Stuart Huckins of Timber Engineering Co. of New England was of material assistance. J. E. Myer, formerly of Timber Engineering Co., helped organize the project. Gordon Hill, M. M. Platt and R. W. Anderson were of particular assistance in helping to carry out these tests to a successful conclusion.

Precast Columns and Timber Bents Combined for Rigid Frames

Contents in Brief—To save critical materials in an 80x240-ft. one-story industrial building, a combination timber and concrete design was developed in which reinforcing and structural steel totaled only only 3.5 lb. per sq. ft. of building area.

A ONE-STORY FACTORY building recently completed on the West Coast has the advantage of wide spacing between columns, 25 ft. of headroom under the overhead crane, and yet makes use of only a minimum of critical materials. In part, this was made possible by the fact that timber beams 40 ft. long were available, but the outstanding feature was the design of precast concrete columns that could carry the main loadings in the structure with need for only a very little steel.

The building is 80 ft. wide by 240 ft. long, rectangular in plan and divided by a central row of columns, along the 240-ft. dimension, into two 40-ft. bays. Principal elements in the structure are precast concrete columns placed 30 ft. apart in the two exterior walls and along the long center line. Each of these three rows of columns are connected, longitudinally, by a timber truss which provides the longitudinal bracing. The transverse members are 12x24-in. timbers, 40 ft. long, resting on top of the precast columns. These beams, in turn, support 8x12-in. purlins on which the 2-in. sheathing of the flat slope roof is carried.

The 40-ft. beams are rigidly fastened to the column tops by steel plates and timber connectors so that under lateral loads as well as gravity loadings the columns and the roof beams can be considered rigid frame bents that will resist deformation. The purlins, similarly, which span the 30-ft. bracing between the timber beams are placed on 6-ft. centers and likewise have connections detailed to carry horizontal loadings.

The precast columns are 19x24 in. in section and are reinforced with four 1¼-in. square bars whose tops extend above the concrete to permit welding them to the ⅜-in. gusset plates that join the heavy timber beams to the column tops. On the columns are reinforced brackets set at the proper height for supporting the concrete crane girders extending longitudinally along both side walls and on both sides of the central row of columns. By pouring these crane girders in place after the columns and roof framing had been erected it was pos-

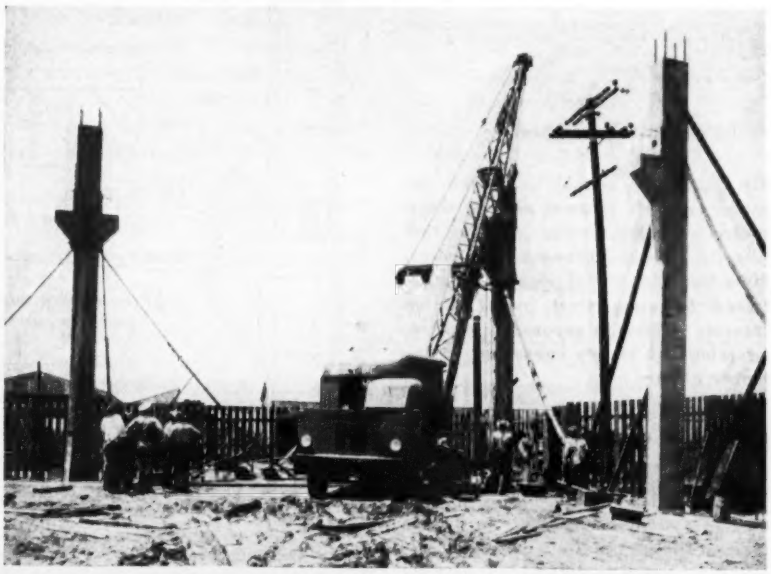


Fig. 1. Precast columns weighing about eight tons were set up by a crane.

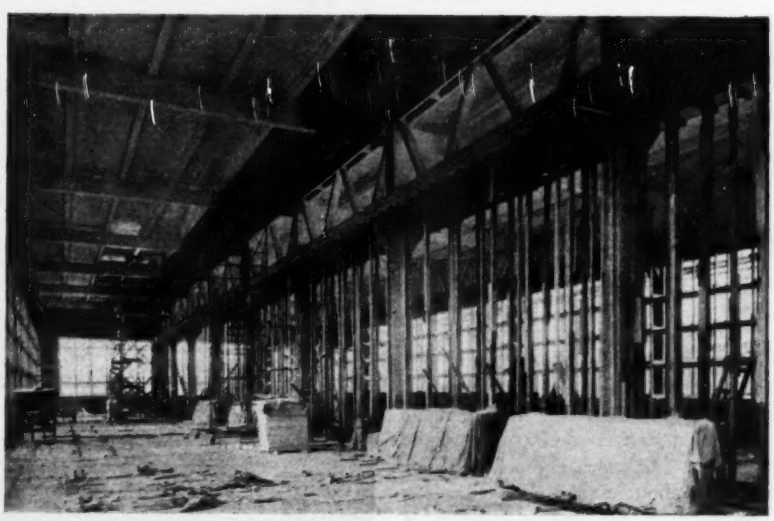


Fig. 2. Cast-in-place concrete crane girders for both bays tied the columns together along the bottom chords of longitudinal timber trusses.

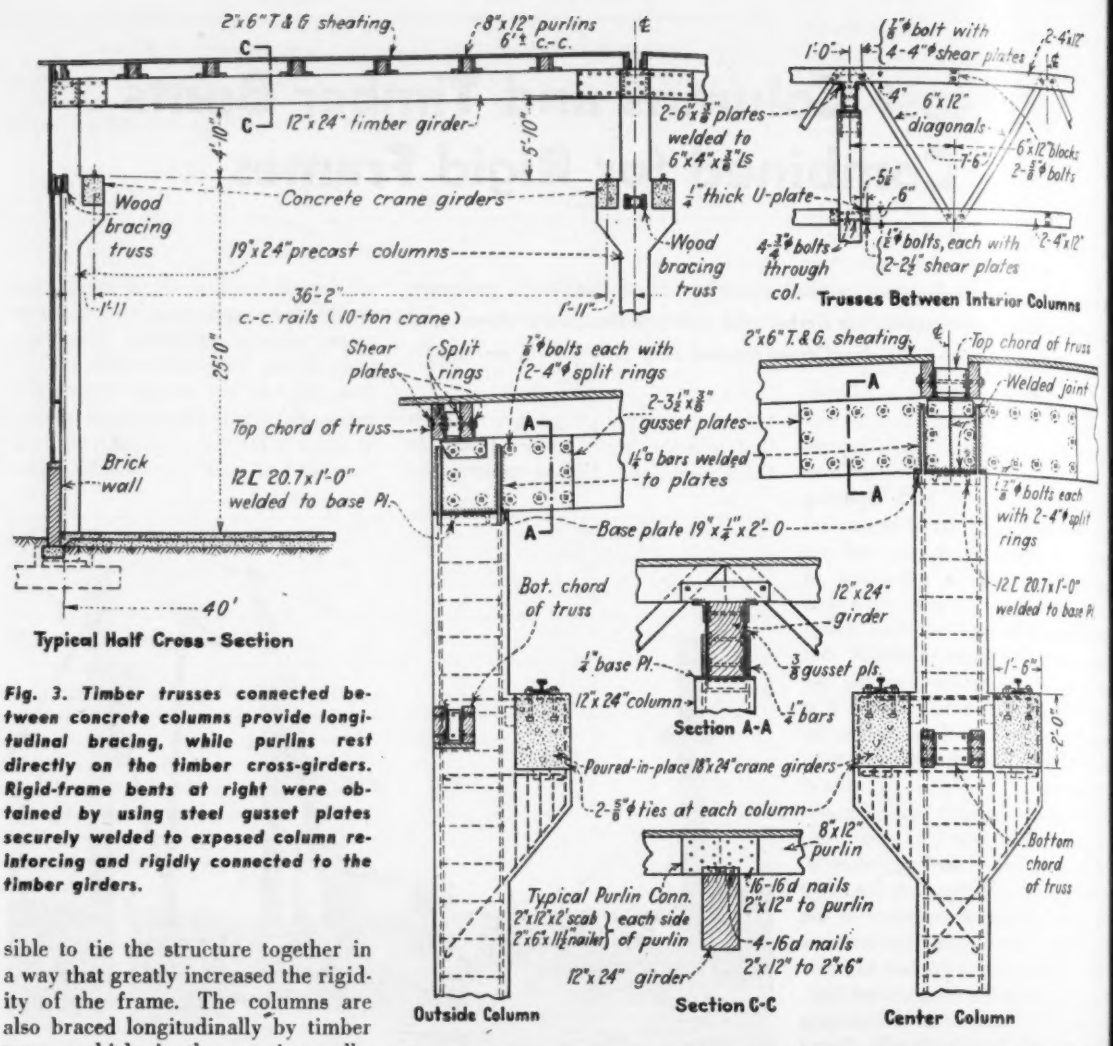


Fig. 3. Timber trusses connected between concrete columns provide longitudinal bracing, while purlins rest directly on the timber cross-girders. Rigid-frame bents at right were obtained by using steel gusset plates securely welded to exposed column reinforcing and rigidly connected to the timber girders.

sible to tie the structure together in a way that greatly increased the rigidity of the frame. The columns are also braced longitudinally by timber trusses which, in the exterior walls, serve as lintels over the continuous windows.

The construction of the building was carried on without difficulty and the structure was ready for occupancy about forty days after ground was broken.

While the footings were being excavated and the foundation poured, the concrete columns were cast in wood forms on the building site. At the same time the timber bracing trusses and the timber girders were being prefabricated.

Erection similar to steel building

After the foundation was ready and the concrete piers had set, the framework of the building was erected much as a steel frame building is put together. The precast columns, which weighed about eight tons each, were picked up in the casting yard by a truck crane, carried to the building, and set down on top of the founda-

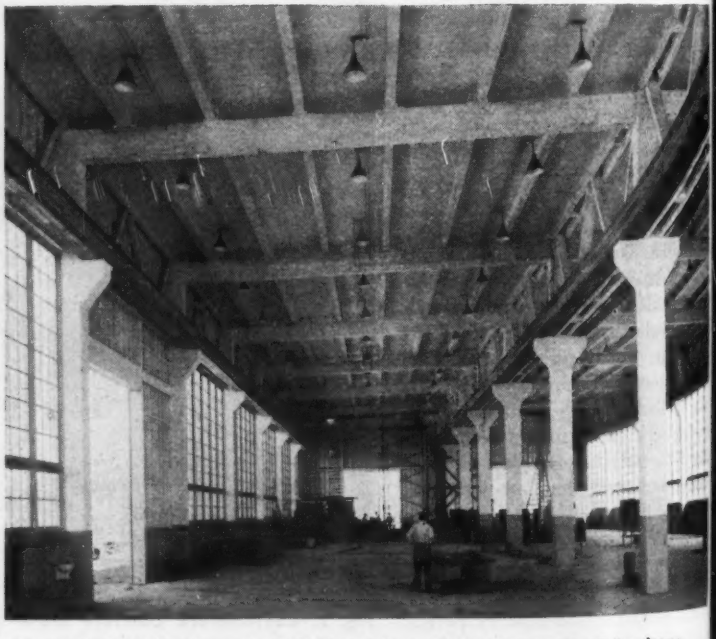


Fig. 4. The building is well lighted and has notable economy of headroom.

...ns. Base angles, cast in the col-...ns, were firmly secured to anchor ...lts. The columns then required no ...re temporary bracing, than would ...ve been used for steel columns of ...e same height.

After roof beams and bracing ...usses were set up by the same crane ...d bolted in place, construction ...roceeded with the brick and wood ...sh walls, the purlins and roof ...eathing was put on and the concrete crane girders were then poured.

Despite the wide column spacing and the height of the runways for 10-ton crane loadings, with connections adequate to resist lateral forces (wind and earthquake) of 0.08g, the completed structure contains only 3.58 lb. of steel per square foot of building. This steel is distributed as follows: roof framing (including column connections and bracing trusses) 0.72 lb., columns 1.07 lb., crane girders (not including crane rails) 1.20 lb., foundations, walls and floors combined 0.59 lb.

The building was designed by and the construction work supervised by the office of J. H. Davies, consulting engineer, Long Beach, Calif. James R. Bole, structural engineer, was in direct charge of the design, and the structure was erected under a contract held by MacIsaac & Menke, Los Angeles.

Machine Developed to Test Mass Concrete in Place

A new machine developed by the ...incinnati, Ohio, laboratory of the ...S. Engineers, to determine the dy...mic modulus-of-elasticity of con...ete for structures such as dams, ...ghway slabs and concrete run...ys, is expected to prove of great ...lue. The machine is used to deter...ine over intervals as short as one ...ot the velocity of vibration trans...ission through large masses of con...ete. A power amplifier capable of ...livering 50 watts at audio frequen...es of the order of 1,500 cycles per ...cond is employed.

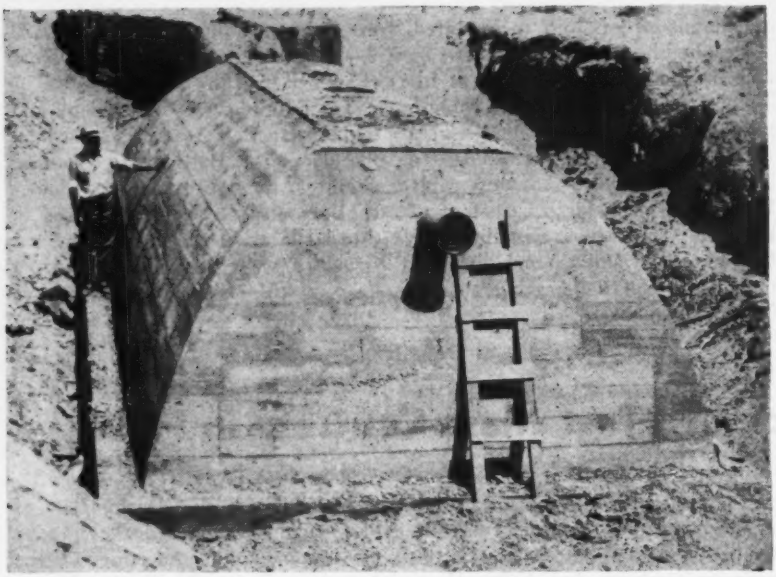
Vibrations at different points on ...e concrete surface are analyzed by ...eans of a cathode ray oscillograph. ...reference signal from the terminals ...the vibrator is connected to the ...rizontal input of the oscillograph, ...d the output of a vibration pickup ...connected to the vertical input of ...e oscillograph. The resulting Lissa...us figure represents the phase dis...cement of the two signals. A ...nge from a straight line in the ...st and third quadrants to a straight ...e in the second and fourth quad...nts, or vice versa, represents a ...se change of 180 deg., which is a ...f-wave-length of the vibration.

The test procedure in using the ma...ne, which is shown by an accom...ying illustration, is simple. First ...vibration pickup is placed at a ...nt on any radial line from the ...rator and the frequency of vibra...n adjusted until the condition of ...er zero or 180-deg. displacement ...sts; next, the pickup is moved ...ng the radial line to a second ...nt away from the source of vibra...n until a phase change of 180 ..., occurs. Then the distance be...en these two points, which cor...ponds to a half wave-length of the vibration, can be measured.

The values so obtained may be readily converted into terms of the dynamic modulus-of-elasticity. However, it has been found that, due to phase retardation or other influences not completely understood at this time, values so obtained are significantly less than those obtained from the measurement of the flexural frequency of small laboratory specimens.

Bartlett G. Long and H. J. Kurtz, civilians in the Cincinnati laboratory responsible for the development of the machine, described the unit at the recent annual meeting of the American Society for Testing Materials. They explained that further analytical studies will be required before the full potential value of the new method can be completely realized. Such studies are now under way in the Cincinnati laboratory, and a number of determinations have been obtained on airfield runways in service. However, these results cannot be described at this time.

This portable "oscillator-vibrator-pickup-oscillograph" unit permits vibrations in the concrete to be analyzed by means of the cathode ray tube. The power amplifier delivers 50 w. at audio frequencies. The vibrator is a rebuilt, auditorium loud speaker.



Unreinforced concrete septic tank at a Yuma, Ariz., housing project which has a capacity of 1,800 cu. ft. It was designed to accommodate 350 persons.

Plain Concrete Septic Tanks For Small Housing Projects

John Girand
Johannessen & Girand, Consultants
Phoenix, Arizona

UNREINFORCED CONCRETE TANKS for underground storage of liquids have been successfully built for use as septic tanks on a number of Arizona housing projects. Without the use of critical materials of any kind, the tanks are built as an arch in section so all stresses are compressive and reinforcing steel eliminated. Inlet and outlet pipes are vitrified clay tile; interior baffles are of redwood.

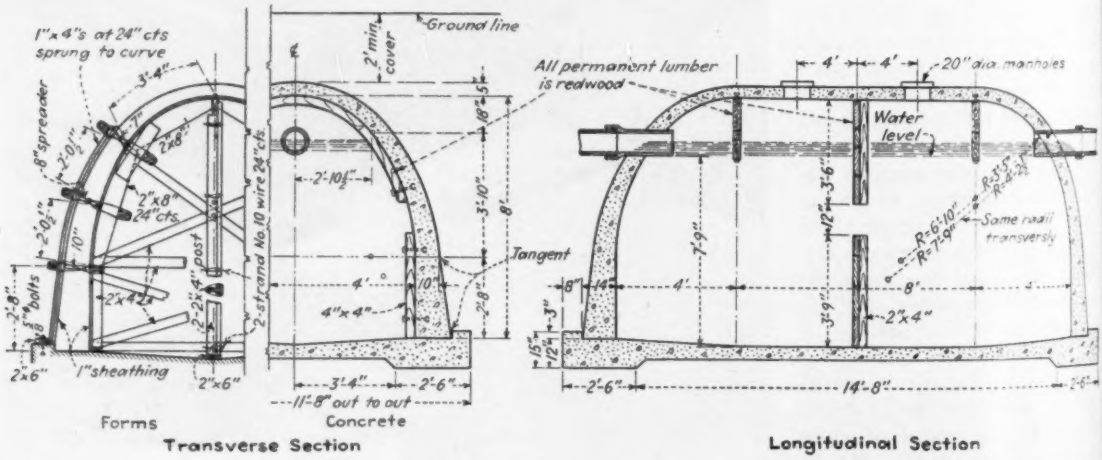
To simplify form work, end sections were designed as arches with the same radii as the barrel section. All ribs were cut at a carpenter shop, and after erection sheeting was nailed on in random lengths, the end cuts being made with an electric-driven portable saw. Exterior forms were made in panels and tied to the interior forms.

After the base was poured, the arch sections were placed continuously, avoiding the use of construction joints. As these particular tanks were to be used for sludge storage chambers, no special precautions were necessary to prevent leakage at the base slab joint. For clear liquid storage, a keyway or water stop would be provided.

Solves special problems

The tank for a housing project at Yuma was built to solve a special problem. The slope from the housing project to an existing sanitary sewer line about half a mile away was too slight to allow direct connection of discharge lines. The tank was installed at this project to retain the settleable solids and thus permit the discharge of a relatively clear effluent to flow from the tank to the existing sewer lines despite the very flat grade. Sewers in the housing area have a 0.4-ft. per 100 ft. fall to the tank while the outfall line has only 0.1-ft. per 100 ft. Trapping the sludge and allowing only liquid to flow out avoided the necessity for a sewage pump and motor.

Means are provided to close the



Radii of unreinforced concrete arches was made the same, longitudinally and transversely, to simplify details of design and form construction. The arch section was placed monolithic to avoid construction joints and forms wrecked into small pieces for removal through manholes.

let of the septic tank by a gate in adjacent manhole, then fill the hole with water to flush the flat dient outfall line. Top of the hole is at an elevation such that hydraulic grade line can be raised give a velocity of 2.0 ft. per sec. The tank at Yuma was designed to mmodate a population of 350 sons, with an estimated flow of gal. per capita day. The tank has effective volume of 1,800 cu. ft., ich gives a 12 hr. detention period. dge collected in the tank can be ped occasionally into an adjacent manhole and flushed to the outfall lines.

A tank at Avondale, Ariz., is structurally similar but has a capacity of 2,200 cu. ft. sufficient for a population of 469 persons at 70 gal. per capita day, with a detention period of 12 hr. A smaller tank, with only 650 cu. ft. capacity, was designed for a project at Buckeye to serve 140 persons.

The specifications require the backfill to be placed evenly around the tank to prevent unequal loading during the backfilling operation. It is further required that all backfill be thoroughly tamped to insure support for the walls when the tank is full of water.

The tanks are provided with one or more manholes in the top. Manhole covers are of vertically laminated wood construction.

The projects were constructed by the Federal Public Housing Authority, Langdon W. Post, director Region X. Design and site engineering plans were prepared by Johannessen & Girand, construction engineers of Phoenix, Arizona.

Ohio Extends Use of Chemicals To Free Highways of Ice and Snow

ring the past winter the Ohio Dertment of Highways, due to the essity of conserving snow plow des, made extensive use of raw micals, either sodium chloride or cium chloride, in the removal of w and ice from the state highways Ohio. The chemicals were spread over one thousand miles of road, luding brick, concrete and bitumus type pavements. A number of vantages were shown for this thod of snow removal, including e of application, moderate cost, l effectiveness. Because of the exiences during the past winter the io department now considers raw micals to have an important place snow removal and ice control. Eximents have shown that raw chemls, placed at the proper time, are re effective than treated abrasives, h as sand or cinders.

Whirling spreader used

Generally the chemicals were spread en the snow had fallen to a depth one-half to one inch at the rate of m 200 to 400 lb. per mile. Where intensity of the storm was such t the chemicals could not be apd before the snow had reached a th of over one inch, the roads e plowed, with the plow blade be- kept approximately one inch from surface of the pavement. Follow- the plowing, in those instances, chemical was applied.

The chemicals were spread by k, using one of several methods, the most successful scheme was the use of a whirling spreader, similar to a grain spreader, attached to the tail-gate of a truck. Another method was to cut four or five slots in the tail-gate of the truck allowing the chemical to fall on a baffle board as it poured from the holes. The matter of distribution in this method was controlled by shifting a metal plate attached to the tail-gate to restrict or enlarge the openings. A cruder method was used by means of a metal funnel attached to the truck tail-gate, the chemicals upon leaving the funnel falling upon a baffle board that spread the material over a width of a few feet.

Ordinary chemicals not effective

Past experience had indicated that most of the snow in Ohio falls at temperatures between 28 and 32 deg. F. Further, it had been discovered that not any of the commonly used chemicals were efficient at extremely low temperatures. However, if the chemicals were applied early in the storm, when the temperature was reasonably high, it was found that in the case of a subsequent temperature drop the chemicals prevent the snow from packing and it remains in a mealy condition and thus is not a traffic hazard. In the case of packed snow or ice and continued low temperatures chemically treated abrasives are necessary.

For the range of temperatures above 20 deg. F. the chemicals had an important advantage over abrasives in that they could be applied more quickly, as less material had to be spread, less trips were required, a substantial saving was made in snow plow blades, and fewer workmen and trucks were needed. The saving on hauling equipment resulted in a large conservation of truck tires, which is considered especially important at the present time. Ohio is fortunate also in that the chemicals are available at reasonable costs.

The chemicals were used for snow removal on brick, bituminous and concrete pavements and, on pavements of the latter type, less than four years old, chemicals were not added unless the finished slab had been treated with linseed oil emulsion or had been constructed with cement to which Vinsol resin had been added in order to prevent scaling. However, with concrete slabs older than four years, that had never scaled, no damage was considered probable as a result of the application of the chemicals.

Results depend on local conditions

Experiments in Ohio in the use of raw chemicals have been tempered by local conditions of snowfall and temperature and the results obtained might not be applicable in other regions of the country. Further, it is felt that definite conclusions should not be made until the Ohio department has been able to carry on these experiments for at least another year or so.

Hal G. Sours is chief engineer of the Ohio Department of Highways and H. D. Metcalf is head of the maintenance bureau. Lowell F. Schaeublin, as assistant engineer in the maintenance department, performed an important part in the work described.

Fig. 1. Through traffic along Duquesne Way is carried at lower level; local traffic is accommodated at street elevation.

Allegheny County Improves Duquesne Way

***Contents in Brief**—Duquesne Way, an express road along the Allegheny River in Pittsburgh, is soon to be completed. To accommodate east and west through traffic, a boulevard passing under all the river bridge approaches was built near the water front. Two 30-ft. roadways, separated by an island in which a line of the Pennsylvania R. R. is carried on a viaduct, were constructed farther inland and at a higher level to carry local traffic. Alteration of the approaches and construction of the retaining walls and pavements was accomplished with little interference to traffic on existing streets.*

STEP BY STEP an express road along all sides of the "Golden Triangle" in Pittsburgh is being completed. In 1940 a 2,900-ft. long expressway south of the Golden Triangle along Water St. and on the right bank of the Monongahela River was built (*ENR* March 28, 1940, p. 434). This year Duquesne Way, an express road parallel to the Allegheny River and north of the business district, will be completed. Future plans provide for improved approaches to the Point and Manchester bridges, where the two rivers join to form the Ohio, and for a cross-town route to join the eastern ends of Duquesne Way and Water St. When all this work is complete, roughly 300 acres forming the heart of Pittsburgh will be surrounded by an express road and better connections will be provided for several of Pittsburgh's many bridges (Fig. 2).

Construction of Duquesne Way is of interest because of the manner in which through and local traffic are accommodated on roadways at different levels without the use of viaduct construction. For the Water St. improvement, the local-traffic boulevard, nearest the river, was carried on an extensive continuous steel girder viaduct. In planning Duquesne Way, high retaining walls supporting extensive fills were adopted as permitting construction of all roadway slabs on the ground, except at overpasses and ramps. As a result, although of greater length, Duquesne Way will cost about $2,000,000, as compared to $2,500,000 for the Water St. work.

Also, maintenance costs on the Duquesne Way are expected to be less and the general appearance of the river front will be greatly improved. On the Water St. improvement the wharf area terminates in a paved slope at the water's edge. This construction has proven difficult to maintain and not too convenient for river craft docking in that area. On Duquesne Way a vertical-faced wharf wall provides much more convenient docking facilities.

Duquesne Way extends from Barau St. to Eleventh St., a distance of 00 ft. (Fig. 5). The through or press traffic is carried on a boulerd of 42-ft. minimum width underssing the 6th, 7th and 9th St. idges. This roadway is all new conuction and is located on granulated g fill behind a reinforced-concrete arf wall extending to 5 ft. above ol level in the river. The wall is pported 14 ft. below pool level on od piles and a continuous steel eetpile cutoff wall. Between the arf wall and the express boulevard a paved wharf area 20 to 40 ft. wide use of river traffic. The area is parated from the boulevard lanes a detachable timber guard of a ecial design, Fig. 6, which permits ick removal of the guard, in case floods.

Behind a reinforced-concrete reining wall 20 ft. high supported on st-in-place concrete piles are roadys of 30-ft. minimum width for the st-bound and west-bound local traf; only at the ends of the project n local traffic get down to the exess level. The roadway for eastund local traffic is located farthest om the river and will consist of a w concrete slab along the historic reet known as Duquesne Way, from hich the project gets its name. These o roadways are separated by a 50- center area broken at frequent inrvals by connections passing under e Pennsylvania R. R. viaduct.

The value of the Duquesne Way ork is illustrated by the fact that bere construction was started the only adway along the street was a 30-ft. ide, rough, stone-block pavement ilt many years ago.

Wharf wall built first

Little interference to traffic on exting streets and bridges occurred uring construction. The first job as to build the wharf wall. or the most part this nstruction was carted out between o continu-

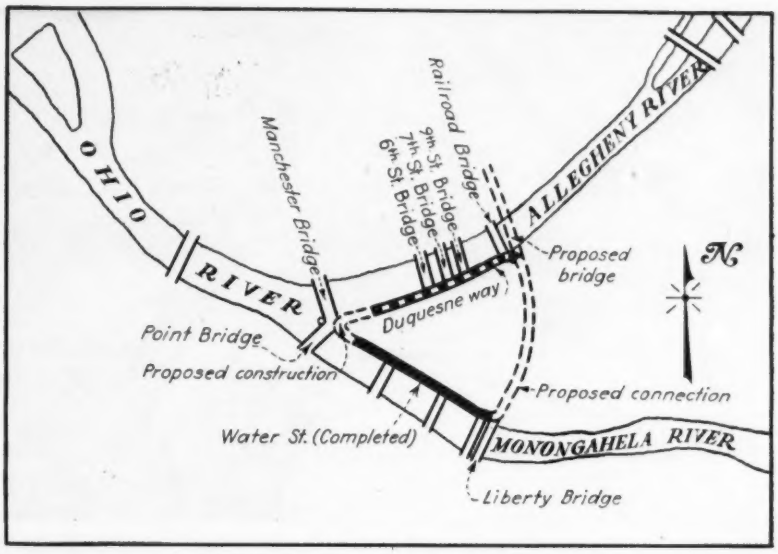
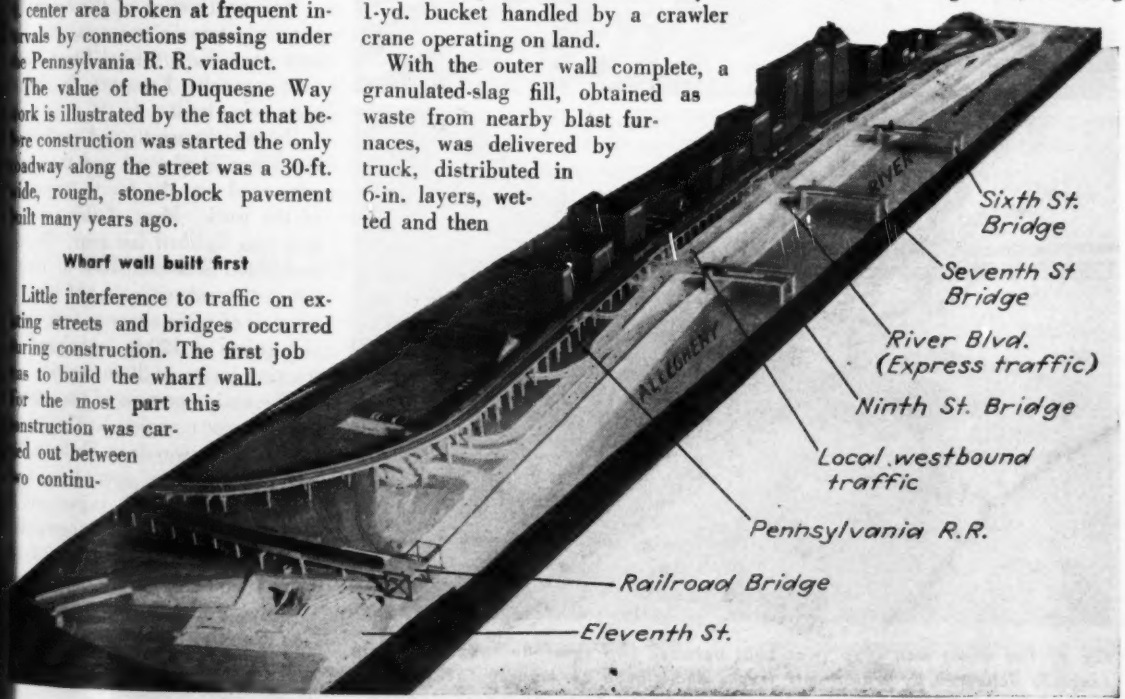


Fig. 2. Duquesne Way forms the Allegheny River section of the express highway system planned for the Golden Triangle area of Pittsburgh. Construction shown as proposed work is now being studied as possible postwar projects.

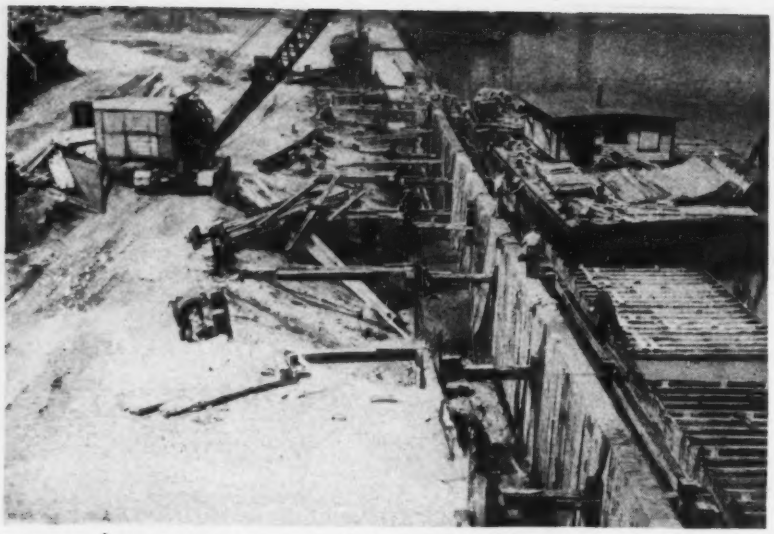
ous cofferdams of steel sheetpiling about 40 ft. long. After the steel piling cutoff wall below the footing of the wharf wall had been driven by a floating rig, the timber piles to support the wharf wall were driven and the space between the temporary coffer walls unwatered. Next, the wall was constructed in alternate lengths, concrete being delivered by agitator trucks and placed in the forms by a 1-yd. bucket handled by a crawler crane operating on land.

With the outer wall complete, a granulated-slag fill, obtained as waste from nearby blast furnaces, was delivered by truck, distributed in 6-in. layers, wetted and then rolled in place. The next step was the construction of line walls *A*, *B*, and *C* shown in Fig. 5, which are supported on cast-in-place concrete piles. The fill behind these walls, which was added to raise the ground to the required levels for the westbound roadway and ramps, were then constructed of granulated slag.

In constructing the wharf wall and the outer retaining wall, mooring



g. 3. How through traffic is carried under the river bridge approaches is illustrated by this photograph of a model built aid in design of the expressway.



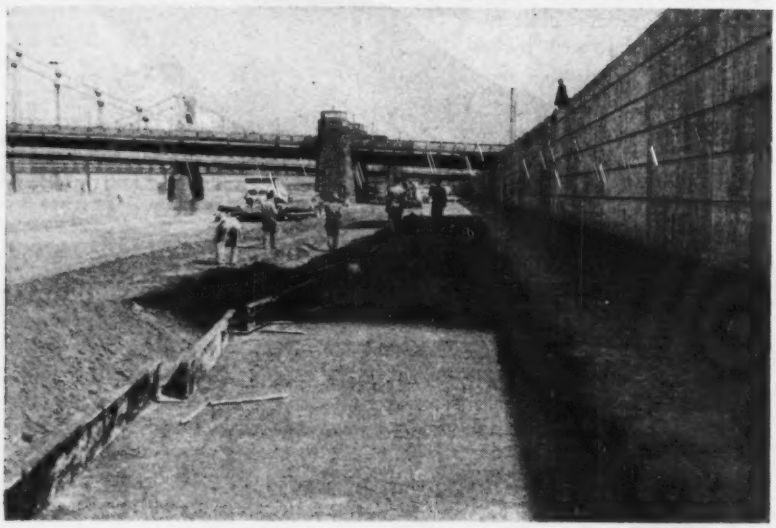


Fig. 4. The wharf wall (top) was built between two sheetpile cofferdams with concrete delivered by transit mix trucks and placed by cranes. The retaining walls (center) where built in alternate sections. River Boulevard (bottom), which provides two lanes each way for express traffic, extends under river bridge approaches.

rings to permit river traffic to tie to these walls had to be provided at frequent intervals. Each ring was designed for a pull of 40,000 lb. The design worked out is considered new in that the ring does not extend beyond the face of the wall. The mooring rings and the smooth, metallic lining of the pockets are made of wrought iron, forged and welded. The rings used are illustrated by Fig. 7.

Alteration of approach structures

The third major part of the work was alteration of the bridge approach structures under which the expressboulevard passes. This work was to provide better entrances for the westbound traffic and consisted primarily in widening the approaches.

In the alteration of the approaches to the bridges, all of which carry heavy automobile and street car traffic, only one approach was altered at a time, as the work required closing the bridge to traffic during part of the operation. The Sixth St. approach was rebuilt first and required closing this crossing for only two weeks, during which time traffic was routed over the Seventh and Ninth St. bridges. So short an interruption to traffic was made possible only by the close cooperation of the railway company, the other public utilities companies and the several contractors.

While alteration of the bridge approaches was in progress, the overpass over the low-level River Boulevard opposite Fancourt St. and its ramp were built.

Paving the westbound roadway of the River Boulevard and the underpass road was the fourth major part of the work. Most of this construction was finished last year. Recently completed was the work of placing the eastbound roadway, which is a 10-in. slab of plain concrete with expansion joints on 120-ft. centers and contraction joints on 20-ft. centers.

The major portion of the construction is now completed. That section of the expressway from Barbeau St. to Seventh St. was opened to traffic about the middle of August and the remainder is approaching completion.

The work is under the jurisdiction of the commissioners of Allegheny County, John J. Kane, chairman, Geo. Rankin, Jr., and John S. Herron. General and detailed design, as well as the supervision of construction of Duquesne Way, is by the Department of Works of the County of Allegheny

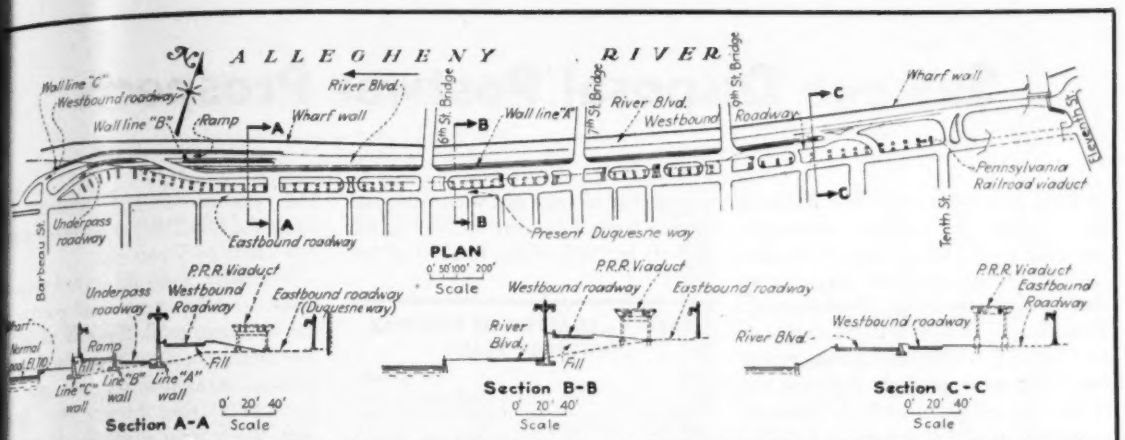


Fig. 5. Over 4,000 ft. long, Duquesne Way extends from Barbeau St. to Eleventh St. Except at the crossovers, the roadway pavements are built on slag fills between retaining walls.

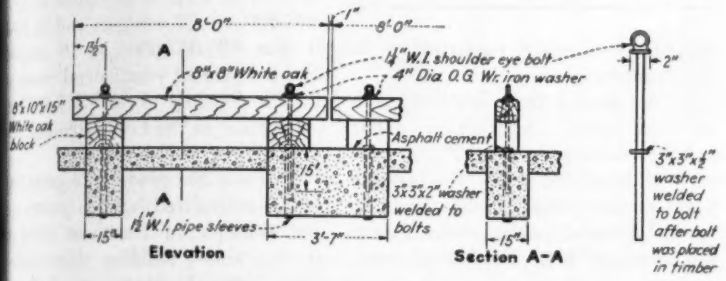


Fig. 6. Guard rails between roadway and wharf were designed for quick removal.

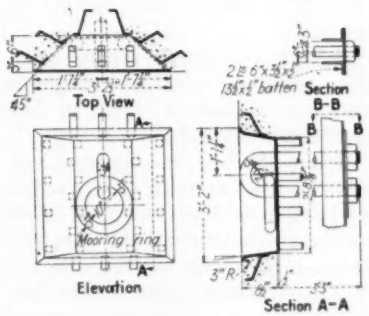


Fig. 7. Details of mooring rings.

Lt. Col. John F. Laboon, now with the U. S. Army, was director at the start of the work and John B. Sweeney is now director. Levi Bird Duff is chief engineer; Charles F. Houlihan, assistant chief engineer in the bureau of design; S. M. Madancy, road design engineer; S. A. Shubin, bridge design engineer; J. S. Devlin, assistant chief engineer in charge of construction; C. K. Harvey, office engineer, and H. J. Dickman, construction engineer.

Contractors employed on the work to date include the following Pittsburgh firms: John F. Casey Co., wharf wall, retaining walls and grading; Carl J. Jacobsen, superstructure and bridge approach alterations; Raphael Electric & Engineering Co., electrical work; Fort Pitt Malleable Iron Co., hand railings; Sanctis Construction, Inc., paving river boulevard and westbound roadway for local traffic; Dinardo, Inc., paving eastbound roadway for local traffic; and Theo. Gianoutsos, field painting.

Linseed Oil Stops Scaling of Concrete Pavement

A cheap and effective way to reduce and possibly eliminate scaling on the surface of new concrete highways has been developed by the Ohio State Highway Department. The surface of newly laid pavement is sprayed with an emulsion of linseed oil.

Although used only a short time in Ohio, the linseed-oil treatment has practically eliminated scaling in pavements now nearly three years old. Since scaling very seldom occurs on pavements after the first four years, the application of the oil is considered by the Ohio highway department to have a definite advantage. The cost is 2.5 c. per sq. yd.

To apply the linseed oil, water and kerosene are added at the rate of one part of oil to an equal volume of kerosene and eight parts of water, plus addition of ¼ lb. of soap powder for every gal. of linseed oil.

Pressure distributor used

The resulting emulsion is applied by a standard bituminous pressure distributor at the rate of 0.1 gal. per sq. yd. In warm weather the water evaporates in about one hour to leave the surface of the pavement coated with a film of oil; the purpose of adding the water is to increase the total volume of liquid applied so that it can be applied by a distributor.

Laboratory experiments resulting in the development of the above procedure were conducted by John Goshorn, bituminous engineer at the testing laboratory of the Ohio highway department, for which Hal. G. Sours is director and H. D. Metcalf, chief engineer of maintenance.

Inasmuch as linseed oil has recently become a critical material, the Ohio Department of Highways has been obliged to curtail this type of work to a large degree. However, engineers at the Ohio highway testing laboratory are now conducting a series of experiments using other materials.

Sewage Disposal Postwar Prospects

SEWAGE AND WASTE DISPOSAL holds a high place in postwar planning, amounting to 6.65 percent of all the specific postwar projects reported to date by *Engineering News-Record*. This is an estimated dollar volume backlog of $217,842,000 for sewerage out of postwar projects reported up to the end of August of all types of construction which aggregate $3,271,550,000. Additions to this reservoir of specific projects are coming in steadily.

In addition to these specific projects, tentative sewerage programs have been announced, which to date exceed $163,000,000.

Before the war, the reported volume of new sewerage construction established its high record in 1939 with a year's total of $160,000,000. This contrasts with a depression low of $22,000,000 in 1933. In the prewar period, sewage and waste disposal ranged from 2 percent in 1932 to 6.3 percent in 1935 of the total of all reported engineering construction in the country.

TABLE I—ANALYSIS OF POSTWAR SEWERAGE PLANS

		Percent
Sewers	$119,183,000	54.8
Treatment plants	61,165,000	28.0
Combined sewers and plants	33,307,000	15.3
Garbage and waste disposal	4,187,000	1.9
Total	$217,842,000	100.0

In the period from 1925 through 1939 sewerage construction dollar volume averaged $91,437,000 for each of the fifteen years. The last five years of this period, under the stimulus of Federal public works financing, averaged $122,400,000 per year. The prewar 15-year average exceeds the $85,218,000 average for the war years by 7 percent.

Normally, federally-owned projects make up only a very small portion of the sewerage total, the bulk of facilities being constructed by local authorities, municipalities and sanitary districts. During the war years, however, the federal share has increased. In 1940, $2,151,000, or 2.3 percent of the sewerage volume was federally-owned; in 1941 it amounted to $17,448,000, or 20 percent; and in 1942 it was $89,837,000, or 76 percent. For the current year federal construction is expected to total $35,400,000, 79 percent of the ENR estimated sewerage construction volume.

The war has produced a great deal of de-centralized sewage treatment, for example, a treatment plant to serve a single building rather than a whole city. Army camps, air bases, large industrial plants, even new housing projects have had their own sewage disposal facilities built where community facilities were lacking or of insufficient capacity.

Whether this war experience will have any effect in the postwar period on the ratio of expenditure going into sewers and that going into treatment plants, cannot be detected from a study of available figures.

TABLE II—ANALYSIS OF PREWAR SEWERAGE WORK

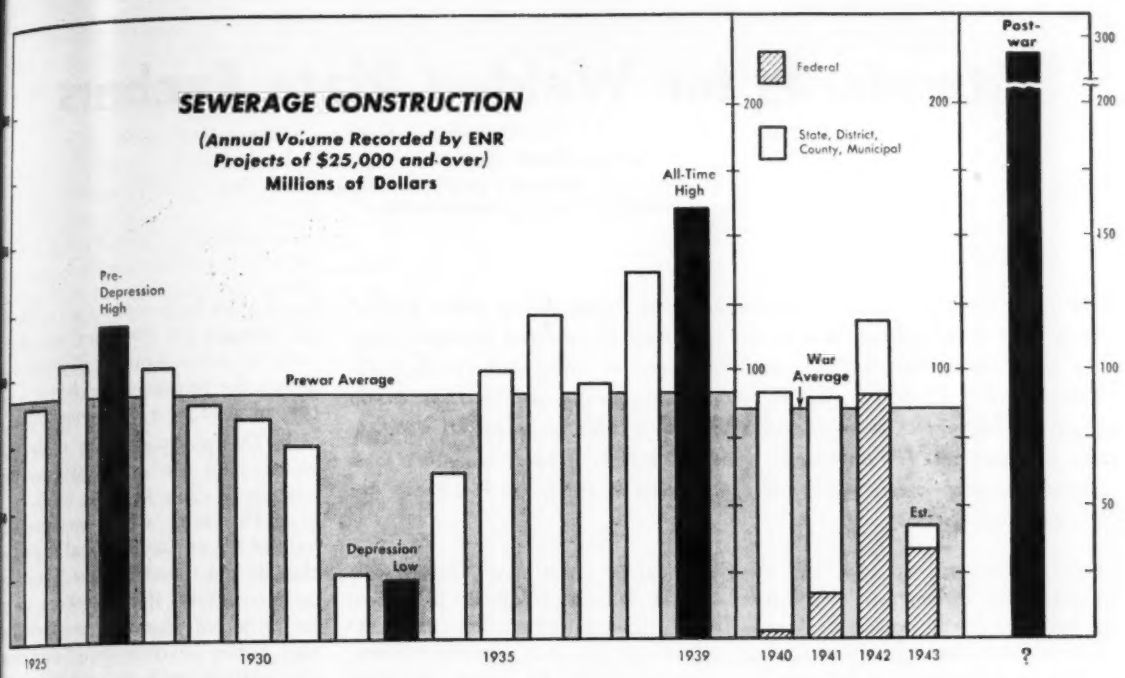
	1936	%	1937	%	1938	%
Sewers	$63,065,000	52	$54,346,000	57	$89,448,000	66
Treatment plants	41,725,000	34	28,828,000	30	28,643,000	21
Combined sewers and plants	14,464,000	12	7,523,000	8	14,610,000	11
Garbage and waste disposal	1,802,000	2	4,597,000	5	3,374,000	2
Total	$121,056,000	100	$95,294,000	100	$136,075,000	100

TABLE III—POSTWAR SEWER AND SEWAGE TREATMENT PROJECTS
(Over $500,000; as reported in Engineering News-Record up to Aug. 31)

Location	Project	Amount
New York, N. Y.	Incinerator and garbage disposal	$1,750,000
	Sewage treatment plant (Port Richmond)	5,750,000
	Sewage treatment plant (Rockaway)	2,300,000
	West side interceptor sewer (Manhattan)	35,000,000
	Sanitary cutoff sewers (Manhattan)	700,000
	Storm and sanitary sewers (Manhattan)	3,503,000
	Combined sewer (2nd barrel) (Maspeth)	600,000
	Storm sewers (Manhattan)	3,400,000
	Intercepting sewer (Whitestone)	1,500,000
	Storm water sewers (Springfield Gardens)	554,000
	Sewage treatment (Owls Head)	14,600,000
	Sewage treatment plant (Hunts Point)	9,000,000
Cleveland, Ohio	Sewers, various city areas	3,000,000
	Sewage plant expansion	5,346,000
Detroit, Mich	Sewer improvements	1,287,000
San Francisco, Cal	Modernizing sewer system; new sewage treatment plant	24,290,000
Detroit, Mich	Incinerators, sewers, pumping-stations, etc	14,856,000
St. Louis, Mo	Sewers, various city areas	8,692,000
Houston, Tex	Sanitary sewers	2,000,000
	Storm sewers	835,000
Memphis, Tenn	Sewerage facilities, and road work	18,656,000
Waterloo, Iowa	Sewer extensions, garbage grinding plant	2,125,000
Rochester, Minn	Sewage treatment plant	600,000
Charlotte, N C	Sewage plant extensions; new plant	2,055,000
Tacoma, Wash	Sewer lines and plant	3,000,000
Muscatine, Iowa	Sewage disposal plant	500,000
Cincinnati, Ohio	Sewage disposal plants	17,000,000
Great Falls, Mont	Storm sewers	2,000,000
Indianapolis, Ind	Sewers, various city areas	3,534,000
New Haven, Conn	Sewers and treatment plant	3,500,000
Elyria, Ohio	Rebuild sewer lines	1,000,000
Spokane, Wash	Sewer lines, rebuilding	2,000,000
Evansville, Ind	Sewerage system	500,000
Gary and Hammond, Ind	Storm sewers	4,582,000
Vancouver, Wash	Storm sewers	1,591,000

Types of Improvements

The $217,842,000 now earmarked for postwar construction is subdivided as shown in Table I. A similar analysis of new construction for the years 1936, 1937 and 1938 shows the relations set forth in Table II. Sewers account for 55 percent of the postwar total, compared with 52 to 66 percent (an average of 59 percent) of the new construction contracts awarded in the three prewar years, 1936 through 1938. Sewage treatment plants make up 28 percent of the postwar plans compared with 21 to 34 percent, (an average of 28 percent) of prewar contracts, and combined sewers and plants get 15 percent of postwar attention compared with 8 to 12 percent (an average of 10 percent) in the three prewar years. Postwar refuse and waste disposal,



at 2 percent, compares with 2 percent for two of the prewar years, 5 percent for the third. This analysis suggests that the postwar period will see an increase in the building of complete systems, combined projects, sewers and treatment plant.

Some of the larger North American postwar sewerage projects for which specific plans have been made that have been reported by *Engineering News-Record* are given in Table III. That is supplemented by a tabulation of some large projects for which planning still is preliminary, Table IV.

Industrial waste treatment

Neither the postwar sewerage projects nor most of the programs announced to date include industrial wastes treatment, which was nipped in the bud by the war, just as it promised to get under way. This rich field for extensive postwar development, therefore, appears to hold possibilities for a considerable amount of additional work, particularly if some practical by-product recovery can be found to help finance the cost. Even without by-product recovery, the pressure on industry from anti-stream pollution agencies will assure a development of this phase of the market not now measurable statistically.

Sanitation abroad

American sanitary engineers are setting high standards of sanitation in many lands where American bases are established for military or transport service. Sewage disposal plants have been built to serve American-built air bases in South America. Also, the health and sanitation section, Institute of Inter-American Affairs, had been sending sanitary engineers to Latin America for some time. Much of this work will be swamp drainage and mosquito control especially in its early stages. It is too early to measure a postwar market for American sanitation equipment that could develop as a result of this pioneer work, but it probably will be small for some time.

Some of the Latin American communities that have recently announced plans for municipal drainage or sanitation include:

The Venezuelan Ministry of Public Works, at Caracas, plans a sewage disposal system; waterworks and sewers in Irapa; sewers in San Carlos, Puerto Cabello and Maiquetia.

In Mexico, Civil Governments, Palacios Municipal, plan water and drainage at Queretara. $190,000 loan; water, drainage and street works, Oaxaca City, $165,000 loan; general public works, particularly water and drainage, Mexico City, $2,000,000. Cuautla Municipal Government, Palacio Municipal, plans water and drainage system improvements, reconditioning streets and a spa at Amilcingo, $615,000.

The Mexican Government, Department of Public Health, Mexico, D. F., in August announced plans to provide water and sanitation services in 71 communities in 20 states along Mexican sections of the Inter-American Highway in cooperation with Office of Coordinator of Inter-American Affairs. The cost of this work is estimated to be in the neighborhood of $2,750,000.

Sewerage lags behind other improvements as a country develops, irrigation, water supply, ports, railroads, highways and airports, hydroelectric projects come out of the public works funds first for they so directly and obviously benefit agriculture, transportation and commerce.

TABLE IV—POSTWAR SEWERAGE WORK FOR WHICH ONLY TENTATIVE PLANS HAVE BEEN MADE

(Work not included in Table III)

Chicago, Ill., additional collection facilities, sewerage system	$20,000,000
Baltimore, Md., sewers	8,000,000
Philadelphia, Pa., new commission on city planning appointed. Master plan includes preparation of a plan for a new sewage disposal system	Amount not stated
Delaware Basin—Interstate Commission on the Delaware River Basin, authorized to make surveys for postwar program to rid the Delaware and Schuylkill rivers of silt, sewage and other impurities (Cost to be divided 4 ways, federal, state, municipal, industrial)	100,000,000
New York City. Projects in addition to those listed in Table III for which no definite plans have been made, which are expected to cost	35,000,000

Standards for Welded Plate Eyebars

Jonathan Jones,
Chief Engineer, Fabricated Steel Construction
Bethlehem Steel Co., Bethlehem, Pa.

***Contents in Brief**—Large forged eyebars no longer being made, welded designs for structural members of this type must be resorted to, and in fact are more convenient and economical and just as safe. Built up of plates assembled with fillet and plug welds an eyebar design used in a suspension bridge anchorage has been used as a basis for a table of suggested standard sizes and sections. The data upon which the article is based were first presented in a paper submitted in the competition of the James F. Lincoln Arc Welding Foundation.*

THE ADVENT OF WELDING has terminated the economical application of the forged-head eyebar. So true is this statement that the only remaining eyebar manufacturer in the country has dismantled his forging equipment and announced that forged eyebars hereafter will be made only in sizes of 6 in. and under.

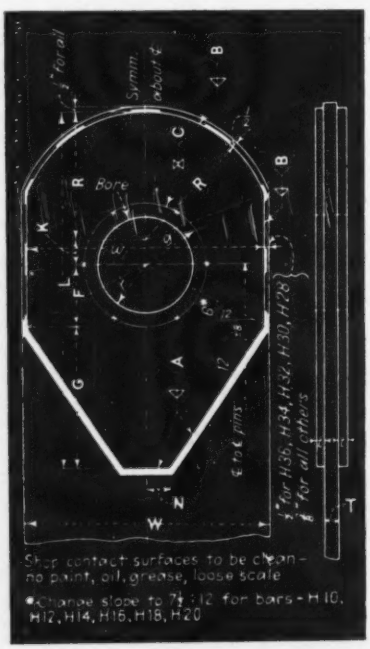
The use of welded steel plate eyebars by the author began in 1939 when a contract was let for a long span suspension bridge requiring in its anchorage 152 eyebars each 50 ft. long between pin holes, 12x1⅞ in. (22.5 sq.in.) in cross section and with 28 in. wide forged heads bored for 10 in. pins. The contractor secured permission to discard this design in favor of welded plate eyebars. The 22.5 sq.in. main section was replaced by a wide flat plate of the same area. At each end of this plate, two short plates slightly narrower, were welded on, one on each face, and the pin hole bored through the triple thickness, which was the 1⅞ in. of the original design.

By this means of fabrication, before the section of the main plate was reduced by the pin hole, it was relieved of part of its stress, which passed through the edge fillet welds into the pin plates; and at no point in front of, across, or beyond the 10 in. pin hole was there a "critical" section less in area than the 22.5 sq.in. of the main bar. All of the objectives of the forged bar were, therefore, attained by a less expensive method than forging of the heads; and by a method that is available to any fabricator of bridgework.

The design of this welded head was checked by a test on a ⅜ linear scale model. A load of 535,000 lb. (equal to the average coupon strength of the plate material) was required to break the specimen. No break occurred through the welded head, nor did any of the welding show any distress.

Recommended welded eyebar designs

It may confidently be expected that many tension bars of the wide-plate, welded-pin-plate type will be required in the future, and the writer, with the results of the design and test above referred to before him, has thought it worthwhile to prepare a set of standard designs for structural engineers.


Symm. about ℄
Bore
For all others
Shop contact surfaces to be clean - no paint, oil, grease, loose scale
*Change slope to 7/12 for bars - H10, H12, H14, H16, H18, H20

Details of welded eyebars whose dimensions are given in the accompanying table.

In the accompanying illustration is shown the recommended layout for a typical head. It will be noted that:

1. The pin plates are made narrower than the main plate by just enough to allow for fillet welds.

2. The fillet welds opposite and behind the pin are nominal in size, as they do not transfer stress. They may be intermittent if the eyebars are to be protected from the weather, but may better be continuous, minimum size sealing welds on exposed structures.

3. The important welds are located in advance of the pin hole, so that the combined resistance of the three plates is in operation before any reduction of area by the pin hole is commenced.

4. The fillet welds in advance of the pin hole are strong enough to develop the same proportion of the total tensile force in the bar as the net area of the two pin plates on a transverse section through the centerline of the pin bears to the total net area of the three plates on that section.

5. The total net section through the center of the pin hole is about one-third in excess of the area of the main plate. This was true of the forged eyebar heads, and takes care of peak points of bending stress in the head.

6. The total area on a straight, axial line from the back end of the pin to the back end of the head is about 90 percent of the area of the main plate; it was about 70 percent in the forged head. The danger to be guarded against is that of splitting out behind the pin, the split beginning with a tear in transverse tension at the outer end and progressing inward. In the forged bar, the fibres of the steel received some working in the direction of the transverse tension, but in the new type they remain parallel to their original rolling; hence the conservatism in this feature of the new design.

7. The total thickness of the three plates is not less than one-eighth of the net width through the pin hole, transverse to the axis of the member. Experience has shown that, with thinner plates, there is a danger of "dishing" or "flopping" in the regions behind the pin.

8. The back ends of all three plates are cut on circular arcs, and the center for these arcs is moved somewhat backward from the pin center, thus again preserving the full area of all sections reduced by any part of the pin hole. The chosen radii permit the cutting of these rear edges (before assembly, of course) with a torch swinging about a center, the torch entering and leaving the plate at a reasonable angle, definitely not tangent to the plate edges and making for simple and good-looking cuts.

9. A ring of plug welds is provided around the pinhole. These do not transfer stress between the plates, but are arbitrarily placed to tack the plates firmly together in the vicinity of the boring tool.

There is, of course, for every size of bar, a length below which it would not pay to weld on the pin plates, but where it would be more economical to use a plain rolled plate having the required head thickness throughout. This critical length may best be left to the fabricator to determine, as it depends on the relative material and labor costs in each specific case.

In the accompanying table are given recommended dimensions for a series of welded-head bars. These cover a somewhat wider range than the now obsolete tables of forged-head bars, providing a choice of 62 different net areas, from a maximum of 72.0 to a minimum of 3.75 sq.in.

It is not proposed that these 62 heads become inflexible standards, as the old eyebar heads had to be. The templet cost is so insignificant that it is not to be expected that fabricators will store standard templets as they formerly had to preserve standard forging dies. Neither is it to be expected that engineers will adhere strictly to the 62 net areas listed, if they can economize substantially by interpolating between two areas that are tabulated.

What is hoped, however, is that the heads here detailed will prove to be so acceptable from the standpoints of safe design and economical fabrication that they will become a starting point for standards. If, over the next occurring applications of this type of tension member, the engineers in charge will make full-size tests of a bar or two, as has always been done with forged bars, a feeling of confidence in these heads will soon be established throughout the profession. When that tentative phase is behind us, this schedule can be recognized as a national standard.

DIMENSIONS AND FABRICATING DATA FOR WELDED PLATE EYEBARS

Effect. Net Area	Mark	Main Bar W	Main Bar T	2-Pin Plates w	2-Pin Plates t	L	R	K	F	G	N	2r. Pin Min.	2r. Pin Max.	Welding of One Pin Plate: Welds A	Welds B	Welds C	g
72.0	H36-16	36	2	35	1¼	4'-4½"	1'-7"	3½	8¾	1'-9¼"	3½	12	14	Abt. 57" cont. ⅝	⅞-4 in 12±	6-plugs 1⅞	
63.0	H36-14		1¾		1⅛									" " " ⅝	do.	do. 1⅞	9
54.0	H36-12		1½		1									" " " ½	½-4 in. 12±	do. 1⅜	
51.0	H34-12	34	1½	33	1	4'-1½"	1'-6"	3½	8¼	1'-8"	3½	11½	13½	Abt. 54" cont. ⅝	½-4 in 12±	6-plugs 1⅝	8½
46.75	H34-11		1⅜		⅞									" " " ⅝	do.	do. 1⅜	
48.0	H32-12	32	1½	31	1	3'-10½"	1'-5"	3	7¾	1'-6¾"	3	10½	13	Abt. 51" cont. ⅝	do.	6-plugs 1⅝	
44.0	H32-11		1⅜		⅞									" " " ⅝	do.	do. 1⅜	8½
45.0	H30-12	30	1½	29	1	3'-7½"	1'-4"	2¾	7½	1'-5½"	2¾	9½	12	Abt. 48" cont. ⅝	do.	6-plugs 1⅝	
41.25	H30-11		1⅜		⅞									" " " ⅝	do.	do. 1⅜	
37.5	H30-10		1¼		¾									" " " ½	do.	do. 1⅛	7½
42.0	H28-12	28	1½	27	1	3'-4½	1'-3"	2½	6¾	1'-4¼"	2½	9	11½	Abt. 45" cont. ⅝	do.	6-plugs 1⅝	
38.5	H28-11		1⅜		⅞									" " " ⅝	do.	do. 1⅜	
35.0	H28-10		1¼		¾									" " " ½	do.	do. 1⅛	7½
35.75	H26-11	26	1⅜	25½	⅞	3'-2"	1'-2"	2¼	6⅛	1'-3 7/16"	2½	8½	11	Abt. 42" cont. ⅝	do.	6-plugs 1⅝	
32.5	H26-10		1¼		¾									" " " ½	do.	do. 1⅛	
29.25	H26-9		1⅛		⅝									" " " 7/16	do.	do. 1⅛	7½
36.0	H24-12	24	1½	23½	1	2'-11"	1'-1"	2	5½	1'-2⅛	2	7½	10	Abt. 38" cont. ⅝	do.	6-plugs 1⅝	
33.0	H24-11		1⅜		⅞									" " " ⅝	do.	do. 1⅜	
30.0	H24-10		1¼		¾									" " " ½	do.	do. 1⅛	
27.0	H24-9		1⅛		⅝									" " " ½	do.	do. 1⅛	6½
24.0	H24-8		1		½									" " " 7/16	do.	do. 1⅛	
27.5	H22-10	22	1¼	21½	⅞	2'-8"	1'-0"	1½	5 5/16	1'-0 11/16	1½	6½	9½	Abt. 35" cont. ⅝	½-4 in 12±	6-plugs 1⅝	
24.75	H22-9		1⅛		¾									" " " ½	do.	do. 1⅛	
22.0	H22-8		1		⅝									" " " 7/16	do.	do. 1⅛	6½
19.25	H22-7		⅞		½									" " " 7/16	do.	do. 1⅛	
25.0	H20-10	20	1¼	19½	⅞	2'-6"	11"	1½	6	11½	1½	6	9	Abt. 31½" cont. ⅝	do.	6-plugs 1⅝	
22.5	H20-9		1⅛		¾									" " " ½	do.	do. 1⅛	
20.0	H20-8		1		⅝									" " " 7/16	do.	do. 1⅛	6½
17.5	H20-7		⅞		½									" " " 7/16	do.	do. 1⅛	
15.0	H20-6		¾		⅜									" " " ¼	do.	do. ⅞	
22.5	H18-10	18	1¼	17½	1	2'-3"	10"	1½	5¼	10⅝	1½	5½	8½	Abt. 28½" cont. ⅝	do.	4-plugs 1⅝	
20.25	H18-9		1⅛		⅞									" " " ½	do.	do. 1⅛	
18.0	H18-8		1		¾									" " " 7/16	do.	do. 1⅛	
15.75	H18-7		⅞		⅝									" " " ½	do.	do. 1⅛	6
13.5	H18-6		¾		½									" " " ⅜	do.	do. ⅞	
11.25	H18-5		⅝		⅜									" " " 7/16	do.	do. ⅞	
20.0	H16-10	16	1¼	15½	1	2'-0"	9"	1	4¾	9½	1½	4¾	7½	Abt. 25" cont. ⅝	do.	4-plugs 1⅝	
18.0	H16-9		1⅛		⅞									" " " ½	do.	do. 1⅛	
16.0	H16-8		1		¾									" " " 7/16	do.	do. 1⅛	
14.0	H16-7		⅞		⅝									" " " ½	do.	do. 1⅛	5½
12.0	H16-6		¾		½									" " " ⅜	do.	do. ⅞	
10.0	H16-5		⅝		⅜									" " " 7/16	do.	do. ⅞	
15.75	H14-9	14	1⅜	13½	⅞	1'-0"	8"	¾	4⅛	8⅛	1½	4	6½	Abt. 22" cont. ⅝	½-4 in 12±	4-plugs 1⅝	
14.0	H14-8		1		¾									" " " 7/16	do.	do. 1⅛	
12.25	H14-7		⅞		⅝									" " " ½	do.	do. 1⅛	
10.5	H14-6		¾		½									" " " ⅜	do.	do. ⅞	5
8.75	H14-5		⅝		⅜									" " " 7/16	do.	do. ⅞	
7.0	H14-4		½		5/16									" " " ¼	⅜-4 in 12±	do. ½	
12.0	H12-8	12	1	11½	⅞	1'-6"	7"	½	3½	7	1½	3½	5½	Abt. 18" cont. ½	½-4 in 12±	4-plugs 1⅝	
10.5	H12-7		⅞		¾									" " " 7/16	do.	do. 1⅛	
9.0	H12-6		¾		⅝									" " " ½	do.	do. ⅞	
7.5	H12-5		⅝		½									" " " 7/16	do.	do. ⅞	4½
6.0	H12-4		½		5/16									" " " ¼	⅜-4 in 12±	do. ½	
5.25	H12-3½		7/16		⅜									" " " ¼	do.	do. ½	
4.5	H12-3		⅜		5/16									" " " ¼	do.	do. ½	
7.5	H10-6	10	¾	9½	⅝	1'-3"	6"	½	2½	5½	1	3	4½	Abt. 15" cont. ½	½-4 in 12±	4-plugs ⅞	
6.875	H10-5½		11/16		9/16									" " " 7/16	do.	do. ⅞	
6.25	H10-5		⅝		½									" " " 7/16	do.	do. ⅞	
5.625	H10-4½		9/16		½									" " " 7/16	do.	do. ⅞	4
5.0	H10-4		½		7/16									" " " ⅜	⅜-4 in 12±	do. ⅞	
4.375	H10-3½		7/16		⅜									" " " ⅜	do.	do. ⅞	
3.75	H10-3		⅜		5/16									" " " ⅜	do.	do. ⅞	

Sewer Charts Based on Scobey's Formula

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***Contents in Brief**—Three charts that permit rapid graphical solution to sewer design problems by use of the Scobey formula are made available. Selection of the proper coefficient of friction determines the chart to be used. Once this choice is made, but two of the four variables—slope, capacity, velocity, and diameter—need be known to solve the problem.*

TO PRESENT MODERN DATA in a manner acceptable to the engineering profession the three accompanying hydraulic sewer charts have been prepared, based upon the formula developed by Fred C. Scobey, senior irrigation engineer of the Div. of Irrigation, Soil Conservation Service, U. S. Dept. of Agriculture. After the correct chart has been chosen, by selecting the proper coefficient of friction, a sewer problem is solved in a moment's time. Furthermore, personal observation has shown charts of this type are much more popular in engineering offices than the alignment charts where the relationship of the various functions are not shown in a comparative picture of all the factors.

Use of the Scobey formula is recommended instead of the commonly used Kutter's formula, which was developed in the nineteenth century for open channels and rivers. This formula served its purpose and fit round pipe fairly well. It is accurate for pipe of 14 in. diameter, but is not satisfactory for other diameters.

The Scobey formula was first published in "The Flow of Water in Concrete Pipe," U. S. Department of Agriculture *Bulletin No. 852*. It is stated as $Q = 0.00546 C_s d^{2.625} H^{0.5}$ where Q is capacity in cubic feet per

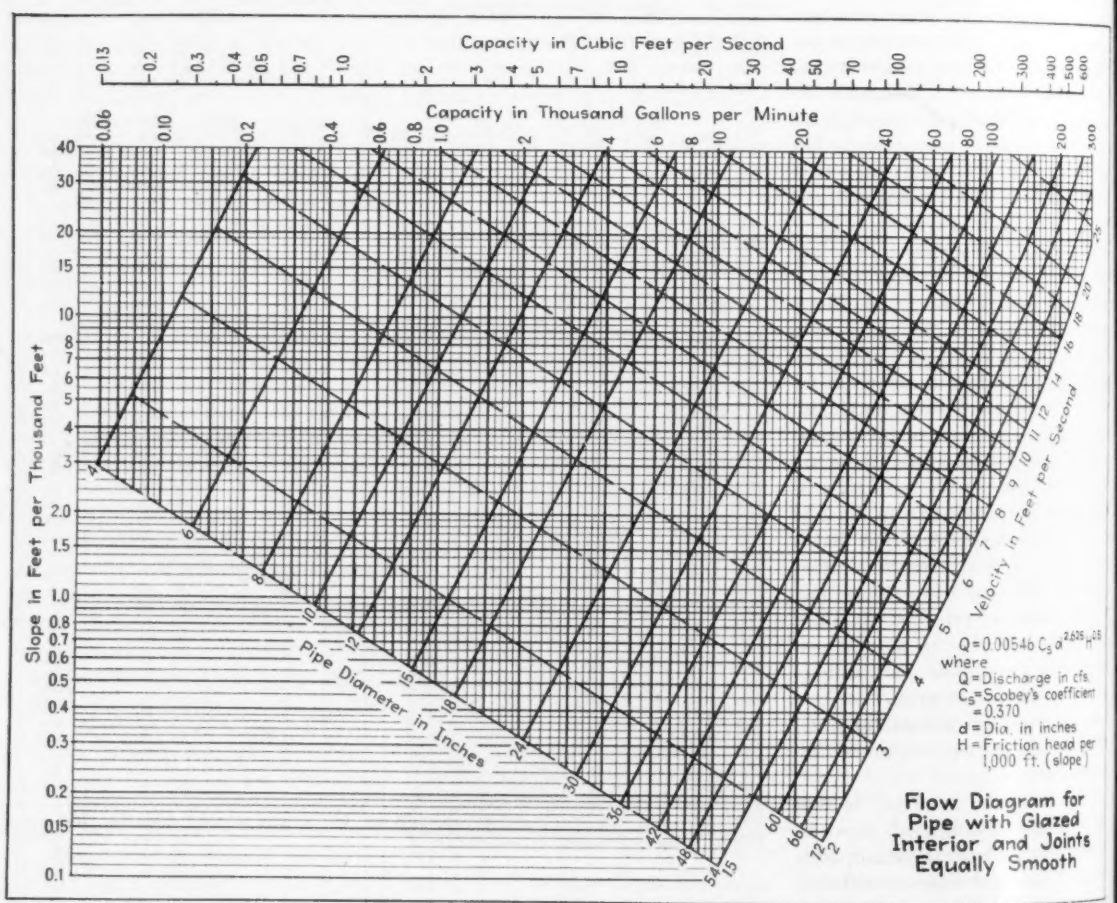
Capacity in Cubic Feet per Second
Capacity in Thousand Gallons per Minute
Slope in Feet per Thousand Feet
Pipe Diameter in Inches
Velocity in Feet per Second
Q = 0.00546 Cs d^2.625 H^0.5
where
Q = Discharge in cfs.
Cs = Scobey's coefficient = 0.370
d = Dia. in inches
H = Friction head per 1,000 ft. (slope)
Flow Diagram for Pipe with Glazed Interior and Joints Equally Smooth

Fig. 1. This chart should be used with caution. It represents the best flow conditions or those that may not last.

cond, C_s is Scobey's coefficient of iction, d is pipe diameter in inches nd H friction head in ft. per 1,000 ft. Each of the accompanying charts is r one coefficient of friction and als with four functions, i.e., fric- n head (slope), capacity, velocity d diameter. Since there were many roblems to be solved to gather the ta necessary to compile the charts, e formula was divided into two rts.

The factor of $0.00546C_sd^{2.625}$ was lculated for the three values of C_s r the several different pipe diam- rs shown on the charts. The factor $^{.5}$ was determined for various as- med heads. By multiplying differ- t values of the two factors together, e capacities for various diameters re obtained. The velocities were lculated from the basic formula $= AV$, where Q equals discharge cubic feet per second, A is the oss-sectional area in square feet, d V represents the average velocity feet per second.

The coefficients of friction were originally published for use with various types of concrete construction and are described in this manner on the charts. However, they may be used for cast iron, vitrified clay, and other types of pipe if the correct coefficient of friction is chosen. Follows a brief discussion of each chart with suggestions for the selection of the coefficient in keeping with good engineering practice.

Choice of coefficient

The chart developed for C_s=0.370 should be used with caution. It represents the best flow conditions that can be expected from sewers with a glazed interior, a condition that will not last when a sewer is to convey either raw or treated sewage.

Coefficient $C_s = 0.345$ is satisfactory for any size of cast iron or monolithic concrete pipe. Due to expected irregularities in the joints, this coefficient should only be used for concrete and vitrified pipe of 24 in. dia. or larger.

The chart for $C_s = 0.310$ generally should be used for jointed concrete or vitrified pipe with a diameter up to and including 24 in. However, it may be used for larger diameters where a slight factor of safety is considered advisable.

The selection of the roughness coefficient is the most important step in solving hydraulic problems of sewers, and the final choice should be based on the above general rules and the engineers personal knowledge of the quality of the construction.

The friction head, shown on the charts as slope in feet per 1,000 ft., represents actual friction loss within the pipe. Extra compensation must be made for the velocity head and entrance loss. The capacity was compiled to read in either cubic feet per second or gallons per minute, and the diameter represents the nominal pipe diameter in inches. The velocity, which by good practice is limited to a minimum 2.5 ft. per sec. for combined storm and sanitary sewers and 2.0 ft. per sec. for separate storm or sanitary sewers, is in feet per second.

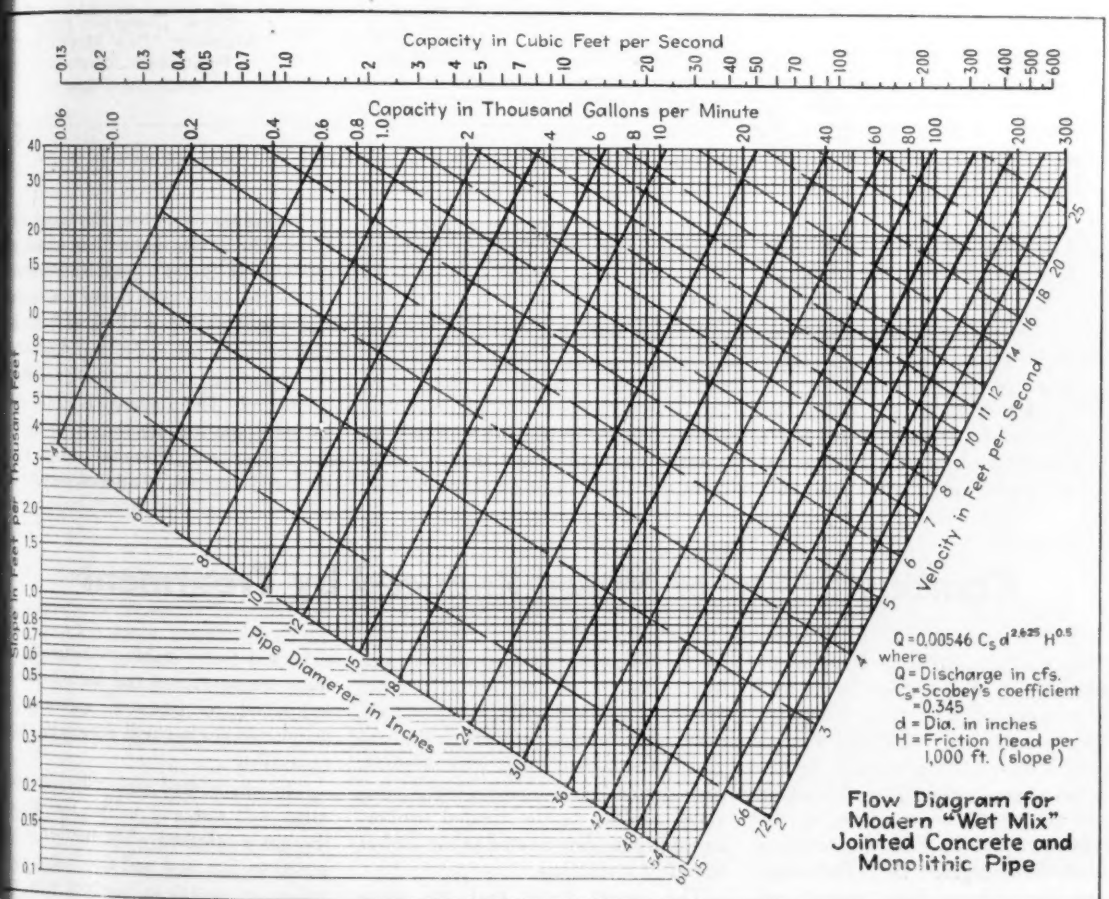
Capacity in Cubic Feet per Second
Capacity in Thousand Gallons per Minute
Slope in Feet per Thousand Feet
Pipe Diameter in Inches
Velocity in Feet per Second
Q = 0.00546 Cs d^2.625 H^0.5
where
Q = Discharge in cfs.
Cs = Scobey's coefficient = 0.345
d = Dia. in inches
H = Friction head per 1,000 ft. (slope)
Flow Diagram for Modern "Wet Mix" Jointed Concrete and Monolithic Pipe

Fig. 2. *Above diagram may be employed satisfactorily for all sizes of cast iron and monolithic concrete sewer pipe.*

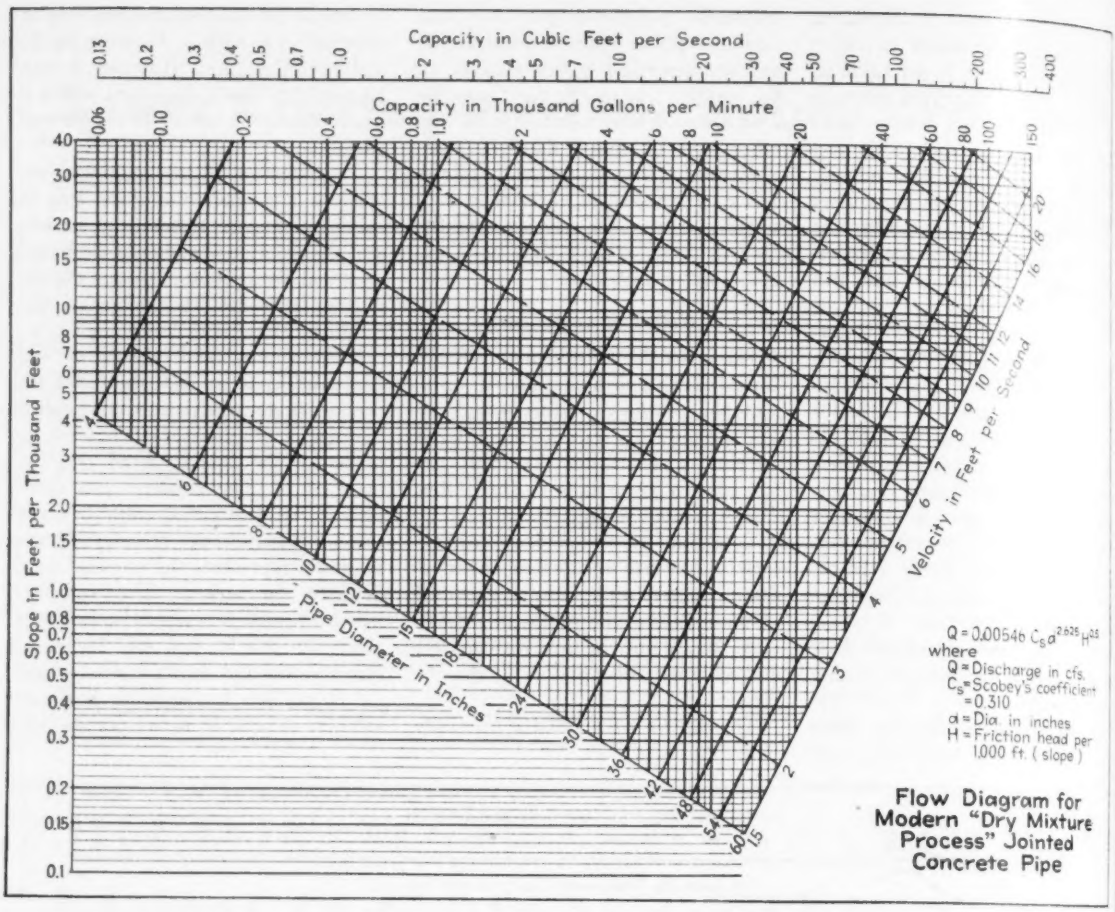
Capacity in Cubic Feet per Second
Capacity in Thousand Gallons per Minute
Slope in Feet per Thousand Feet
Pipe Diameter in Inches
Velocity in Feet per Second
Q = 0.00546 $C_s d^{2.625} H^{.53}$
where
Q = Discharge in cfs.
C_s = Scobey's coefficient = 0.310
d = Dia. in inches
H = Friction head per 1,000 ft. (slope)
Flow Diagram for Modern "Dry Mixture Process" Jointed Concrete Pipe

Fig. 3. This chart should generally be used for jointed concrete or vitrified pipe up to and including 24 in. dia.

A sewer problem contains five variables and the first step in the solution is the selection of the coefficient of friction. Then of the four remaining functions—slope, capacity, velocity and diameter—two must be known or assumed to find the other two.

As an example, assume monolithic construction is decided upon for a trunk sanitary sewer with an expected load of 20,000 gpm. where field conditions limit the slope to a maximum of 1.85 ft. per 1,000 ft. The problem is to determine what coefficient of friction shall be used, what diameter pipe and resulting velocity needed.

In obtaining a solution the coefficient of friction is first chosen. For the problem given it is assumed that competent inspection will result in good construction and that a coefficient of 0.345 can be employed. Thus, the designer is to use the chart for $C_s = 0.345$. He enters the chart at the top at 20,000 gpm. and travels vertically downward to the horizontal line representing a slope of 1.65 ft. (between 1.6 and 1.7). For this point the unknowns, diameter and velocity, are found. The diameter is 42 in. and by interpolation the velocity is about 4.6 ft. per sec. Therefore, to go to a larger diameter is unnecessary.

Combustibility of Wood Reduced by Treatment

The combustibility of Douglas fir and Southern Yellow Pine is reduced by pressure impregnating treatment with chromated zinc chloride, according to a report made recently by the Underwriters Laboratories, Inc., Chicago, to the Grasselli Chemical Department, E. I. du Pont de Nemours & Co., Wilmington, Del. The treatment also reduces flame spread and the amount of smoke produced in comparison to the performance of untreated lumber under similar fire exposure conditions. The lumber will char when exposed to flame or hot gases of sufficient intensity to decompose the cellulose fibers. Flaming reduces rapidly in the treated timber, especially lumber treated to the higher chemical retentions.

The report states that the chromated zinc chloride treatment may be expected to be stable at ordinary indoor temperatures and humidities. If subjected to repeated exposure to water the lumber will regain its combustibility.

The chromated zinc chloride treatment will not add to the toxicity of the gases released when lumber is exposed to fire and will not hasten corrosion of metal in contact with the treated lumber.

ENGINEERING ABROAD AS SEEN BY ENR EDITORS

Sewage Disposal In South America

Edward J. Cleary
Managing Editor, Engineering News-Record
(By airmail from Rio de Janeiro, Brazil)

CONVERSATIONS with consulting sanitary engineers and equipment manufacturers before I left the States some three months ago revealed a lively interest in postwar developments, particularly in relation to sewage treatment in Latin America. There was the general impression that our good neighbors to the south, who are doing much to improve health and sanitation, might be ready to undertake the construction of many sewage treatment plants following the termination of the war.

My observations thus far, reinforced with the comments from sanitary engineers in the various countries already visited, indicate that the installation of sewage treatment works probably will not be undertaken for a long time. Therefore, the potential market for North American engineering service and equipment in this field of sanitation should be considered as quite limited. This is contrary to some pre-conceived notions that I held, and it must be disillusioning to others whose plans for postwar activity included Latin America.

Basic needs come first

In brief, the situation in many of the Latin American countries might be analyzed as follows:

Primary emphasis is being placed—and properly so—on basic sanitation needs such as water supply and malaria control. With the exception of a few of the larger cities, relatively few safe and adequate water supply facilities have been installed. Obviously, with limited financial resources, sewage treatment is relegated to second place.

In the large centers of population where sewerage systems are installed, the cities are either along the ocean front or adjacent to big rivers. In both cases, disposal by dilution is the indicated means for handling sewage wastes.

An exception to the situation is Rio de Janeiro, where growing pollution of the bay waters already has led to action. In 1941 the state completed the installation of the Penha sedimentation plant (largest in Latin America) to treat the flow from a section of Rio containing 40,000 population. This plant is serving as a pilot installation on which studies are conducted that will aid in the design of other, larger plants for the city.

Incidentally, operation of the plant is supervised by a Mrs. Elza Pinho, a sanitary engineer graduate of the National School of Engineering, and a staff member of the Servico Federal de Aguas & Esgotos. The latter is the agency that supervises water supply and sewage disposal throughout Brazil.

The Rio plant is furnished throughout with Dorr Co. equipment, and also includes a 60 horsepower Worthington gas engine which, stated Mrs. Pinho, is probably the biggest sludge gas engine south of the Equator.

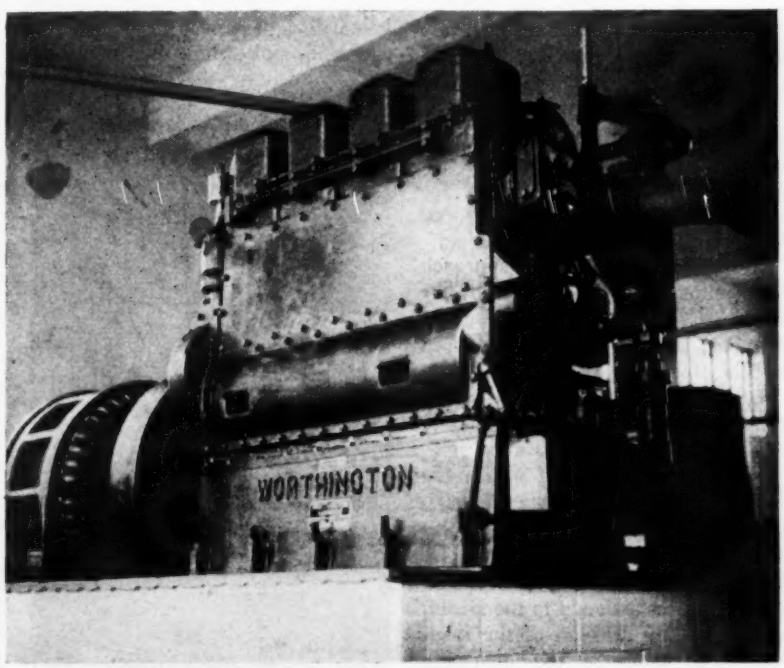

Fig. 1. Said to be the largest sludge gas engine south of the Equator, this 60-hp. installation is in use at Rio de Janeiro's new sewage treatment works.

Fig. 2. Bored-hole latrine construction. An augur bit supported on a tripod is used to drill a 14-in. diameter hole to a depth of 19 ft. On top of this hole is fitted a precast concrete slab around which is erected a simple enclosure.

In the smaller towns and villages sewage collection and treatment facilities are virtually non-existent. Naturally, this creates health problems, but lacking water supply facilities and financial resources, the solution to these problems is not to be found by thinking in terms of sewage disposal based on North American practice.

A realistic approach

Perhaps the most realistic approach to the situation is that devised by the Rockefeller Foundation for use in the Far East, and now being introduced by the Institute of Inter-American Affairs in Brazil. This consists of the construction of "bored-hole" latrines —a simple, inexpensive facility.

In Valadares, state of Minas Gerais, Brazil, I witnessed the installation of these latrines. The work was being done under the direction of Lt. J. C. Bumstead, Sanitary Corps, A.U.S., who is assigned to the Health and Sanitation division of the Institute. The latter is the operating agency of the Office of the Coordinator of Inter-American Affairs.

The latrine is made by boring a 14 in. diameter hole with an earth auger to a depth of about 19 ft. The hole is then covered with a small precast slab, and around this is erected a simple enclosure of adobe brick or woven bamboo. About 1,000 of these latrines are being built in Valadares, which lacks a sewer system.

Fig. 3. Lt. J. C. Bumstead, Sanitary Corps, assigned to work in Brazil.

A deep latrine of this type has a long period of usefulness, it is deep enough to discourage fly-breeding, requires nothing but local materials for its construction and it is easy to keep clean.

On the west coast of South America, particularly in the arid regions where irrigation is required to raise crops, another type of health problem exists. The ditches frequently carry a large quantity of sewage, the flow of which is used to augment the irrigation supply. As a result farm products become contaminated, and the greatest hazard exists in eating anything but cooked vegetables.

To correct this situation calls for installation of comprehensive sewer systems, treatment facilities, and a great mass educational program. Here again the obstacles to early action are lack of finances and the need to provide first the more basic needs of the people, of which water supply ranks of prime importance.

First things first

None of this comment must be construed as reflecting on the advance of sanitation measures in South America. Great progress is being made, but first things must be considered first—the installation of sewage disposal works can be considered only after other needs have been met. To those who may feel otherwise, it need only be recalled that in the United States activity in the field of sewage treatment has been a relatively recent development.

With few exceptions, cities in South America are not ready for sewage treatment works nor will they be for some years to come. This, in substance, is an opinion that is shared by such men as Dr. Luis Mantilla, chief of the department of sanitary engineering of the ministry of public health in Peru, and Dr. Fabio Vieira Marques, sanitation consultant to the state government of Minas Gerais, in Brazil.

Both men are Harvard engineering school graduates who know North American practice and who are striving to adapt this practice to the particular needs of their respective countries. But they are realists, too, and recognize that it will take time to set the stage for sewage treatment.

Free Enterprise

WE MUST ACT TO PRESERVE IT!

☆

KE a leaf floating downstream, we are being carried along toward a new and uncharted economy. What new economy will be like will depend, to no small ent, upon what industry does or fails to do during coming months. Time is short; in fact, we may sud- find ourselves standing on the threshold of a e economy with our war boots still on our feet.

While bending every effort to win the war, we cannot to be caught unprepared for the peace. As Prime ister Churchill said at Harvard, we are "bound, so s life and strength allow and without prejudice to dominating military task, to look ahead to those which will surely come, when we shall have finally en down Satan under our feet and find ourselves other great Allies at once the masters and the nts of the future." Unless we do look ahead, there nger that we may become neither the masters nor ervants, but merely the victims, of the future.

he war has quickened our ailing economy and ed our eyes again to the possibilities of peace-time y. But it has also brought great dislocations of and capital; it has led to abnormal patterns in s and income distribution; and it has created in- nary pressures with enormous potential powers to e or to help us in the transition from war to peace. he pattern of life in postwar America will be just we make it. All of us will have a hand in shaping pattern, but business men will have a special re- ibility in the reconstruction. As employers of labor capital and as enterprisers assuming the risks of ventures, they will have to plan and carry out the ersion from war work to full peace-time production. se of their key role, business men have a special rtunity to discover, and to help others to under- the conditions which are necessary if they are to eir job satisfactorily.

This is a narrow view of postwar problems but it is a central view, because no one condition is more vital to the health of the world than a high level of production and employment in the United States. We cannot hope to lead the world out of economic chaos if we fail to put our own house in order. If we fail to adjust our domestic economy, we may destroy Adolf Hitler; but we will not destroy the germ that breeds "Hitlers." If we do not maintain the production necessary for supporting a large volume of imports and exports, then the plans for international monetary stabilization, for good relations with our neighbors, for rehabilitation of stricken countries, and for strengthening the democratic bulwarks against dictatorship are all likely to come to grief. We must demonstrate our capacity for world leadership, or be content to follow the leadership of others.

The prospects for achieving a sound and vigorous economy in the United States are not so good as to warrant complacency on the part of men genuinely interested in free enterprise and the political freedoms incident to it. We have yet to find means to utilize our vast and abundant resources for the good of all. We have yet to learn how to keep men from the terrible experience of unemployment and the fear of want which makes them willing to sacrifice freedom and opportunity for almost any promise of security. We have yet to reconcile the conflicting interests of labor, agriculture, and business so that they can work together effectively. We have yet to learn how to check the fever of inflation and cure the palsy of depression.

When we were attacked at Pearl Harbor, we realized our physical peril immediately and united in a tremendous common effort against the enemy. The onset of economic perils is less obvious. No bombs will signal the deterioration of the private enterprise system, the extension of regimentation, the further control of busi-

ness by government, and the concentration of political power in less and less responsible hands. If these things should befall us, they will come insidiously while we are preoccupied with self interests and oriented by popular misconceptions. If the freedoms of the individual shrivel as the state grows in power, it will be because the individual is too indifferent or complacent to concern himself seriously with economic problems. If our people are misled by false prophets and demagogues, it will be because business men did not understand economics, because scholars were too ignorant of practical affairs, and because we failed to produce economic statesmen of sufficient stature for the task in hand.

Thinking is hard work. Thinking about things outside our personal experience, about economic processes that are broader and in some fundamental respects different from buying and selling or running a business – is strenuous mental labor. Thinking straight about problems that are beyond our personal and immediate status and our pocketbooks, thinking about problems that involve nation-wide production, nation-wide employment and nation-wide buying power – in other words the operation of our entire economic system – involves real self-discipline. Yet there is no other way to safeguard our freedoms. We cannot rely on trial and error; tinkering takes too long; social experiments which turn out wrong can be undone only at great cost – if at all. If we proceed blindly, we shall flounder into an economic and political morass from which we cannot escape.

We floundered badly all through the Thirties, until the war lifted us temporarily to higher ground. When the war boom is over, we shall be back floundering worse than ever unless we find a solid road along which to proceed.

America has grown rich and strong under a system of political and economic freedom. Opportunity and the necessity of self-reliance have brought forth great accomplishments. The hope of profit and the spur of competition have urged men on to find new and better products, new and better methods, and to risk their savings in pioneer investment. Never has a country achieved so high a standard of living and afforded so large an opportunity for the individual man and woman. It is not surprising that some distinguished business leaders, looking back over their own experience, tell us that everything will be all right if only there is "less government in business."

I wish the solution were as simple as that. However this is only part of the answer. It is becoming increasingly clear that industrial capitalism as we kn it contains within itself certain fundamental weakne which can lead to its destruction if they are not co teracted. No democracy can survive when twenty thirty per cent of its workers cannot get jobs. T happened here in the Thirties. For years on end, des fumbling efforts at recovery one out of every five w ers was denied a chance to earn a living in private b ness. We shall never again have such mass unemp ment as occurred in the bottom of the Depress because the government will take it upon itself create jobs if business cannot offer them. Whene that happens, however, the area of private enterp will be reduced and that of government will be e panded – and the concentration of political power w be increased. This is the challenge we business m face today, and ours is the first opportunity at find the solution.

The crux of our economic problem is unemployme Unless there are jobs for ninety to ninety-five per c of those who are able and willing to work, there will widespread fear and lack of opportunity, which w drive labor unions, agricultural groups, and busi interests to take self-protective measures. Such meas are certain to restrict production, stifle progress, a imperil our democratic way of life. Not all our proble will automatically be solved if we learn how to av mass unemployment, but they will at least then ha good chance of solution.

And so American businessmen face a great respo sibility! We will have to find the answer to a gr many momentous questions. We will have to de into problems that cannot be solved by preceden

Looking backward to these times, future histori are likely to say that here we Americans stood at t crossroads and, consciously or not, made our cho between a system of private enterprise and perso freedom and a system of collectivism and regimentat

It is particularly appropriate, therefore, as the pr lems of our time take shape and as events rearran their order and importance, to appraise the steps w are taking and point the way we are going. It is o plan to present such analyses from time to time to t one-and-a-half million readers of McGraw-Hill pu cations.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, I

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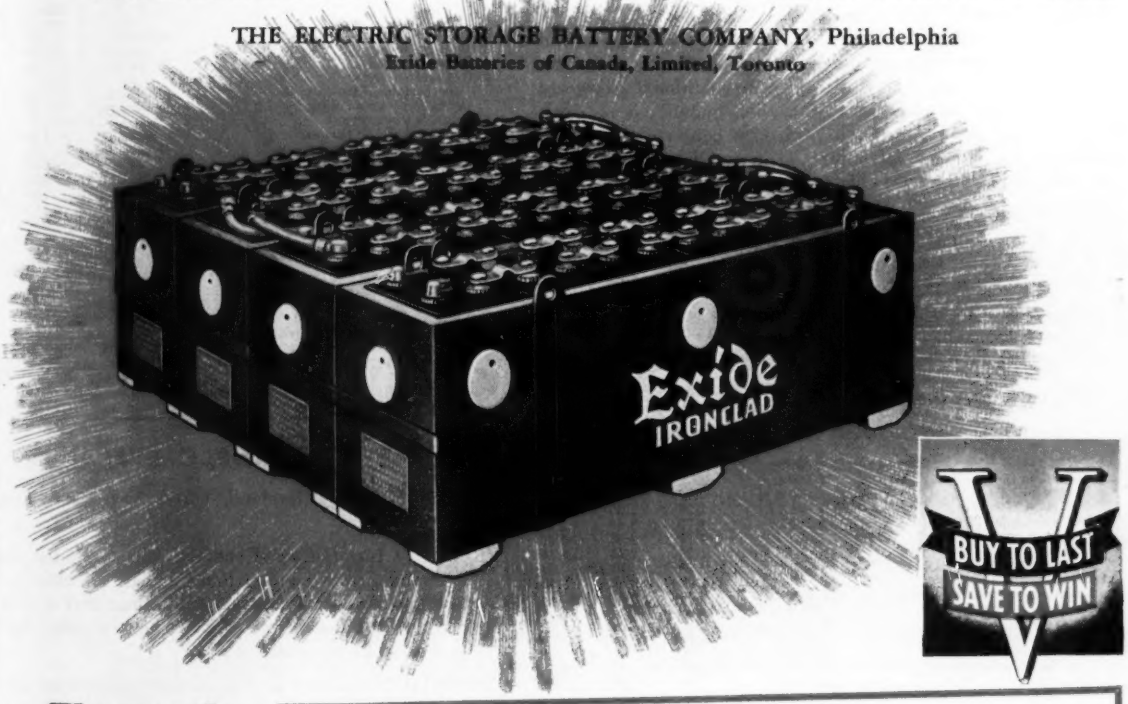

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BACK THE ATTACK—WITH WAR BONDS

CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

DAM AND DIKE, CALIFORNIA

OWNER: California Water & Telephone Co., San Francisco, Clayton B. Neill, chief engr.; Loveland Engineers, San Francisco, consulting engineers.

PROJECT: Construction of concrete variable arch dam across Sweetwater River, 20 miles east of Chula Vista, San Diego County, Calif. Dam about 190 feet in height to center section of spillway; crest length approximately 614 feet. Project is for water supply.

CONDITIONS: Contractor to furnish all materials except cement which is to be supplied by owner; time for completion 270 days. Project is located in very rough canyon country. Highway transportation facilities available to site of work. Wage rates are $1.00 to $1.75 per hour for skilled labor; 95c. to $1.375 for semi-skilled; and 87½c. for common.

BIDS: Seven bids were received August 14, 1943, ranging from the low of $1,114,447 to $1,515,970. Contract was awarded to second low bidder, as the low bidder stipulated that $10,000 plus $0.044 for each cubic yard of concrete, should be added to his bid to provide for pre-cooling of water for concrete. Bidder who received award stipulated an additional charge of 50c. per cu. yd. for each yard excavation quantity is reduced, and $3.00 per cu. yd. for each yard mass concrete quantity is reduced. One bid was irregular and is not listed below. Bids on slide gate, valves and electrical wiring items not revealed.

LIST OF BIDDERS:

1. L. E. Dixon Co., Los Angeles, Calif. $1,114,447
2. Macco Constr. Co., Clearwater, Calif., (contract) 1,114,890
3. A. S. Vinnell Co., and Engineers Ltd., Alhambra, Calif. 1,199,891
4. Ralph A. Bell, San Marino, Calif. 1,241,300
5. Morrison-Knudsen Co., Inc., Los Angeles, Calif. 1,482,980
6. Bressi & Bevanda Constructors, Inc., Los Angeles Calif. 1,515,970

Schedule I — Dam

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Excavation	75,000 c. y.	$4.70	$3.65	$3.75
2. Backfill	6,000 c. y.	.70	.75	2.00
3. Drill grout holes, 0 to 25-ft.	4,000 l. f.	1.75	2.55	2.30
4. Drill grout holes, 25 to 50-ft.	1,300 l. f.	1.75	2.55	2.67
5. Drill grout holes, 50 to 75-ft.	500 l. f.	1.75	2.55	3.05
6. Drill grout holes, 75 to 100-ft.	200 l. f.	1.75	2.55	3.80
7. Foundation grout piping	10,000 lb.	.30	.20	.80
8. Grouting foundation	7,000 c. f.	1.20	2.20	2.25
9. Grout pipe, contraction joints	9,000 lb.	.35	.30	.80
10. Grouting contraction joints	700 c. y.	4.50	7.25	7.00
11. Mass concrete, Class A	73,000 c. y.	9.27	10.00	10.72
12. Reinforced concrete, Class B	200 c. y.	38.75	40.00	60.00
13. Reinforcing steel	60,000 lb.	.058	.08	.10
14. Water and grout stops	4,600 lb.	1.07	.45	1.00
15. Trash racks	14,000 lb.	.12	.22	.20
16. Slide gate	1 ea.	.....	.....	.....
17. Steel sluiceway piping	13,000 lb.	.31	.45	.50
18. Cast iron sluiceway piping	22,000 lb.	.095	.15	.50
19. Butterfly valve	1 ea.	.....	.....	.....
20. Needle valve	1 ea.	.....	.....	.....
21. Hand railing	12,500 lb.	.30	.22	.30
22. Electric conduit and wiring	Lump Sum	.....	.....	.....
23. Misc. structural steel	1,200 lb.	.40	.70	.50
Schedule II — East Saddle Dike				
24. Stripping for embankment	900 c. y.	1.00	.70	.75
25. Stripping from borrow pits	600 c. y.	1.00	.70	.75
26. Earth fill in embankment	6,400 c. y.	.90	1.45	1.00
27. Rock blankets	1,600 c. y.	2.00	2.20	5.00

HIGHWAY, NORTH CAROLINA

OWNER: North Carolina State Highway and Public Works Comn., Raleigh.

PROJECT: Grading and sand asphalt base and surface course for 3.97 miles of U. S. Highway 17 at Hampstead, toward Castle Hayne, in Pender County, N. C. Alternate bids for soil type base course with sand asphalt surface course were also asked.

CONDITIONS: Contractor to furnish all materials and complete work in 110 calendar days. Rail and highway transportation facilities available. Minimum wage rates stipulated are: skilled labor, 55c. per hour; semi-skilled, 35c.; and common, 30c.

BIDS: Two bids were received September 2, 1943, the low of $136,031, and $148,200. No award has been made as yet, but the Highway Commission has asked the concurrence of the Public Roads Administration for awarding the contract to the low bidder.

LIST OF BIDDERS:

1. F. D. Cline, Raleigh, N. C. (low bidder) $136,031
2. West Constr. Co. of North Carolina, Kinston, N. C. 148,200

Item	Quan.	Unit Prices (1)	(2)
1. Clearing	21 ac	$150.00	$300
2. Grubbing	14 ac.	200.00	200
3. Unclassified excavation	23,500 c. y.	.60	
4. Drainage ditches	600 c. y.	1.00	
5. Borrow excavation	21,400 c. y.	.60	
6. Overhaul on excavation (rdwy.) and borrow-free haul dist. 1,000-ft. at ½c. per c. y.	20,000 c. y.	.005	
7. One-half mile overhaul (special)	28,000 c. y.	.06	
8. Subgrade reinforcement	4,000 c. y.	2.00	
9. 3½-in. sand asphalt base course	47,000 s. y.	1.10	
10. 1½-in. sand asphalt surf. course	47,000 s. y.	.55	
11. Class C concrete (headwalls)	16 c. y.	35.00	
12. 30-in. rein. concrete pipe	232 l. f.	6.00	
13. 18-in. plain concrete pipe	732 l. f.	3.00	
14. 24-in. plain concrete pipe	96 l. f.	4.50	
15. 18-in. plain conc. pipe extension	32 l. f.	3.00	
16. Relaid pipe, 18-in. or less	100 l. f.	1.00	
17. Relaid pipe, over 18-in. dia.	50 l. f.	2.00	
18. Shoulder drains	50 c. y.	7.00	
19. Barbed wire fence reset	100 l. f.	.025	
20. Hog wire fence reset	1,000 l. f.	.035	
21. Comb. barbed and hog wire fence reset	100 l. f.	.05	
22. Right-of-way markers	32 ea.	3.00	
23. Install RR advance warning and crossing signs	1 ea.	300.00	250
24. Unclassified structure excavation	400 c. y.	3.50	
25. Remove existing structures	Lump Sum	500.00	575
26. Class A concrete	174 c. y.	38.00	
27. Reinforcing steel	14,780 lb.	.07	

WATER LINE, CLEVELAND

OWNER: City of Cleveland, Ohio; A. G. Levy, Cleveland engineer.

PROJECT: Installation of concrete pipe water line along St. Clair Avenue, from London Road to East 222 Street in Cleveland, Ohio. Involves laying of 9,500 linear feet of 48-in. concrete pipe; 850 linear feet of 30-in. concrete pipe; and 7,300 linear feet of 24-in. concrete pipe.

CONDITIONS: Owner to furnish concrete pipe and contractor to furnish all labor, equipment, and other materials incidental to completion of project. Highway transportation facilities available. Completion time allowed is 210 days. Wage rates are: skilled labor, $1.55 to $1.875 per hour; semi-skilled, $1.00 to $1.50; and common, $1.00.

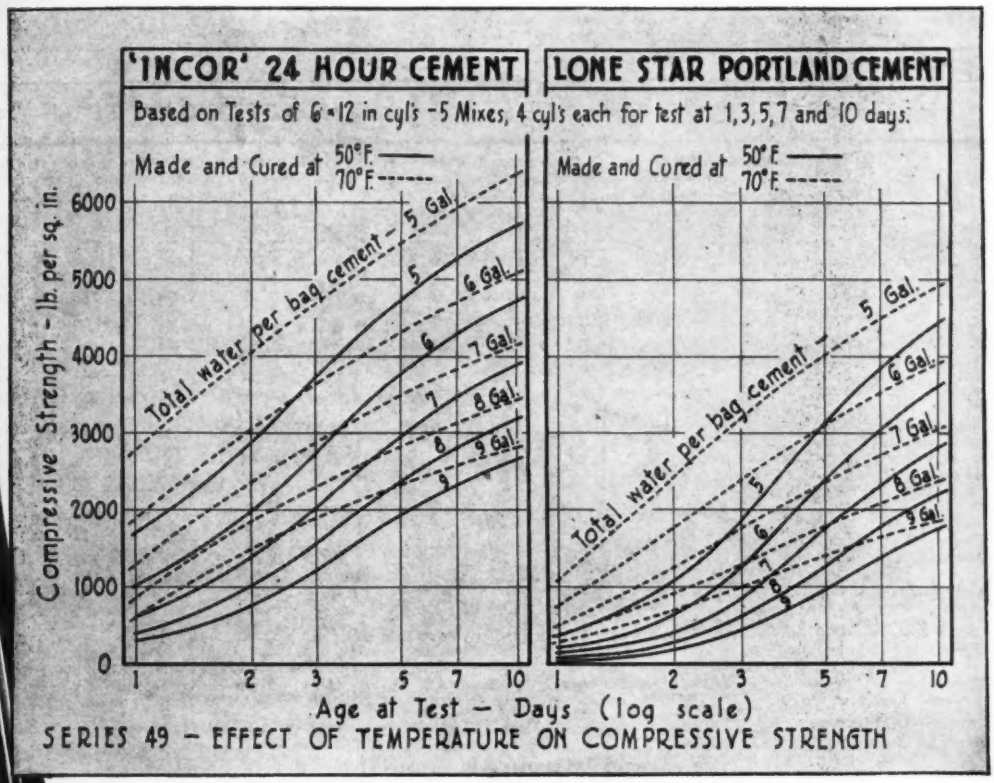
BIDS: Five bids were received July 16, 1943, ranging from the low of $197,800 to $244,840.

LIST OF BIDDERS:

1. Curro Construction Co., Cleveland, Ohio (low bidder) $197,800
2. National Constr. Co., Cleveland, Ohio 213,450
3. Mike Fatol, Cleveland, Ohio 216,000
4. Lock Joint Pipe Co., Cleveland, Ohio 219,000
5. Seth Haddad, Cleveland, Ohio 244,840

Item	Quan.	Unit Prices (1)	(2)	(3)
1. 48-in. concrete pipe	9,500 l. f.	$16.25	$17.75	$14
2. 30-in. concrete pipe	850 l. f.	6.00	5.50	12
3. 24-in. concrete pipe	7,300 l. f.	5.25	5.50	10

'INCOR' KEEPS FALL JOBS ON SCHEDULE


'INCOR' 24 HOUR CEMENT
LONE STAR PORTLAND CEMENT
Based on Tests of 6 x 12 in cyl's - 5 Mixes, 4 cyl's each for test at 1, 3, 5, 7 and 10 days.
Made and Cured at 50° F. ——— 70° F. ------
Compressive Strength - lb. per sq. in.
Total water per bag cement -
5 Gal.
6 Gal.
7 Gal.
8 Gal.
9 Gal.
Age at Test — Days (log scale)
SERIES 49 — EFFECT OF TEMPERATURE ON COMPRESSIVE STRENGTH

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MATERIALS AND LABOR PRICES

Market quotations on construction materials and wage rates reported monthly by ENR correspondents

CONSTRUCTION MATERIAL PRICES for October show little change from a month ago in the twenty cities reported by *ENR*.

Short-leaf Southern pine is $3.00 higher in Chicago, and is up $4.00 per M ft., board measure, in Kansas City. Douglas fir is down $2.50 on 1-in. sizes in Minneapolis. Douglas fir form-grade plywood is unchanged from last month's Seattle base price.

Cement, iron and steel products, structural building [illegible] and roofing supplies remain at September levels, but common brick and straight and [illegible] are higher in Cincinnati.

In Denver, the structural ironworkers' rate is $1.50 per hour, the hoisting engineers' rate is also $1.50, and the plasterers' rate is $1.75 per hour. Common labor rates in all of the cities are unchanged.

CEMENT, AGGREGATES, READY-MIXED CONCRETE—F. O. B. CITY

	PORTLAND CEMENT—Per bbl., C/L lots, incl. 40c. per bbl. for bags, cash dis. not deducted			SAND AND GRAVEL—Per ton, carload lots			CRUSHED STONE Per ton, carload lots		CRUSHED SLAG Per ton, carload lots, f.o.b. plant		CONCRETE BLOCK 8x8x16-in.; truckload del.; per block		CONCRETE Ready Mixed
	Cloth *a*	Paper	Bulk	Gravel, 1½ in.	Gravel, ¾ in.	Sand	1½ in.	¾ in.	1½ in.	¾ in.	Sand-gray, Lt. wgt.	Agg.	1:2:4 mix
Atlanta	$2.77	$2.52	$2.47	$1.79	$1.89	$1.99	$1.79	$1.89	$1.59	$1.69	$0.16	....	$8.00
Baltimore	2.33	2.08	1.88	1.75‡	1.75‡	1.25‡	1.75‡	1.75‡	1.75‡	1.75‡	.125	$0.125*v*	7.25
Birmingham	2.50	2.25	2.10	1.75	1.75	1.50	.85	1.00	.90	1.15	.1425	....	5.80
Boston	2.75*b*	2.40*b*	2.30	1.40‡	1.40‡	1.00‡	1.40‡	1.40‡	....	....	.165	165*v*	7.25*m*
Chicago	2.70	2.45	2.30	2.15‡*d*	2.15‡*d*	2.15‡*d*	2.15‡*d*	2.15‡*d*	1.75‡	1.75‡	.16	.16*x*	....
Cincinnati	2.31	2.06	1.81	1.20	1.20	1.10	1.80	1.80	....	....	.12	.15*w*	6.60
Cleveland	2.40	2.15	....	1.70*i*	1.70*i*	1.60*i*	1.70*i*	1.70*i*	1.75*i*	1.75*i*	.14	.14	7.35
Dallas	2.52	2.27	2.07	1.50*p*	1.70*p*	1.10*p*	1.69*p*	1.79*p*	....	....	.15	....	6.20
Denver	3.08	2.88	2.32	1.20	1.30	1.25	1.65	1.75	1.00	1.00	.15	.15*v*	7.25
Detroit	2.39	2.14	1.99	2.25	2.25	2.00	2.25	2.25	2.00‡	2.25‡	.16	.18*w*	6.50
Kansas City	2.58	2.33	2.18	1.85	2.30	1.00	1.91	1.91	....	....	.125	.125*wy*	7.50*h*
Los Angeles	2.80*c*	2.70*c*	...*u*	1.30	1.30	1.15	1.30*f*	1.30*f*	....	....	.045*bb*	.10*aa*	7.25
Minneapolis	2.90	2.65	....	1.00*h*	1.00*h*	.25*h*	1.00*h*	1.00*h*	....	....	.12	.16	7.10*j*
Montreal	....	1.95*r*	1.79*r*	....	1.65‡*t*	2.05‡*t*	1.05‡*t*	1.15‡*t*	....	....	.14*c*	.14*cc*	7.90*k*
New Orleans	2.41	2.16	1.96	1.65	1.65	.90	....	....	....	....	.19	....	9.25
New York	2.69‡	2.44‡	....	1.60*de*	1.60*de*	.90*de*	1.70*de*	1.80*de*	....	....	.14*cc*	.14*ccc*	7.50*t*
Philadelphia	2.33	2.08	1.88	1.55‡	1.65‡	1.20‡	1.90	1.95	1.10	1.10	.155	.155*w*	8.20
Pittsburgh	2.45	2.20	2.00	1.15‡	1.15‡	1.45‡	2.25‡	2.25‡	1.50	1.50	.17	.17*z*	8.25
St. Louis	2.80	2.52	....	1.75‡	1.50‡	1.25/1.50‡	1.10*h*	1.10*h*	.75*g*	.75*g*	.125	.165*w*	8.00
San Francisco	....*u*	2.41	2.11	1.36	1.36	1.36	1.46	1.46	....	....	....	.20*aa*	7.35
Seattle	2.95*o*	2.75*o*	....	1.00*o*	1.00*o*	1.00*o*	2.00*o*	2.00*o*	....	....	.16	.16*y*	7.25

‡ Delivered. *a* 10c. allowed for each returnable bag. *b* 10c. per bbl. off for cash. *c* Plus municipal tax. *d* Per cu. yd. *e* Barge lots alongside docks. *f* Crushed granite. *g* F.o.b. Granite City, Ill. *h* F.o.b. plant. *i* Within three miles of Public Square. *j* 5% discount for cash. *k* Discount of 2 percent for cash in 10 days. *l* Up to 200 cu. yd. *m* 50c. off for cash. *n* 25 c.y. or more. *o* 2% off for cash. *p* 10c. per ton off, cash 15 days. *r* 10c. per bbl. off, cash 20 days. *s* 8% sales tax included. *t* 8% sales tax not included. *u* Price withdrawn. *v* 20c. per bbl. discount; 20c. allowed for returnable cloth bag. *w* Cinder. *x* Waylite. *y* Haydite. *z* Celocrete. *aa* Pumice. *bb* 4 x 8 x 12 in. *cc* Also 8 x 18 x 18 in.

CASH DISCOUNTS CEMENT to Contractors: truck delivery, 2% for cash on 10th of month; on carload deliveries, no trucking, same as dealer cash discount 10c. per bbl. for payment within 15 days of date of invoice. Subject discount 10c. per bbl. 20 days in Montreal.

CURRENT MAXIMUM PRICES RECEIVED AT CEMENT MILL

Charge for bags not included. For cloth bags, add 40c. per bbl.; 10c. refund allowed for each returnable bag; for paper bags add 15c. per bbl., not refundable

	Bagged	Bulk		Bagged	Bulk		Bagged	Bulk
Buffington, Ind	$1.70	$1.65	Ironton, Ohio	$1.60	$1.55	Richard City, Tenn	$1.80	$1.75
Dallas, Tex. (Inc. 9c. tax)	1.84	1.79	Limedale, Ind	1.70	1.65	Steelton, Minn	1.80	1.75
Hannibal, Mo	1.70	1.65	Norfolk, Va	1.75	1.70	Universal, Pa	1.65	1.60
Hudson, N. Y	1.75	1.70	Northampton, Pa	1.55	1.50	Waco, Tex. (Plus 9c. tax in Tex.)	1.75	1.70
Independence, Kans	1.70	1.65	North Birmingham, Ala	1.70	1.65	Montreal (8% sales tax incl.)	1.68	1.67
						Discount 10c. per bbl. 20 days		

PAVING BRICK, BLOCK, ASPHALT, ROAD OILS—F. O. B. CITY

	PAVING BRICK AND BLOCK: Granite per M. lots of 50,000 4x4x8 in.	Brick per M 3x4x8½ in. carload lots	Wood per sq. yd. 3½ in. 16-lb. treat	PAVING ASPHALT Per ton, less than 80 penetration: Tank car	Drums	ASPHALT BINDERS—FLUXES Per gal., 80–300 penetration: Tank car	Drums	CUTBACK ASPHALT Per ton: Tank car	Drums	ROAD OIL Per gal.	ASPHALT EMULSION (Quick-breaking) Per gal.	
											Tank car	Drums
Atlanta	$73.00	$39.35	$2.25	$18.40*e*	$24.62*e*	$0.0787*e*	$0.1309*e*	$0.0876*he*	$0.1348*h*	$0.0676*e*	$0.0826	$0.1384
Baltimore	150.00‡	48.00	80.00*m*	15.00*r*	21.00*r*	.06*r*	.09*r*	13.00*r*	23.00*r*	.065*r*	.07*r*	.14*r*
Birmingham	150.00	48.00	.....	17.95	.....†	.0747	.....†	.0834*h*	.....†	.065	.09	.....†
Boston	80.00	57.00	3.75	14.20	20.00	.06	.09	.065*h*	.115*h*	.065	.09‡	122
Chicago	150.00	55.00	1.80/2.00*d*	14.00	22.50	13.00*g*	21.50*g*	.0575*h*	.15*h*	.05*n*	.09/10*n*	13/15*n*
Cincinnati	120.00	50.00	.....	16.40	.....	.085	.....	12.25	.....	.07	.085	.....
Cleveland	118.00	37.50	2.25	19.00	20.00	.09	.105	.10*h*	.15	.105	.09	.095
Dallas	.....	36.00	.....	13.65	20.30	.06	.11	16.00	24.80	.06	.05/.07	.07/.09
Denver	.....	66.11	.....	11.00	.....	10.00	.....	.047*h*	.....	.....	.....	.....
Detroit	.....	37.50	.....	18.06*f*	25.60*f*	.0743	.128	.0718*h*	.119*h*	.067	.0755	1149
Kansas City	.....	40.00	.....	18.50	23.50	.077	.1075	.077*h*	.107*h*	.057	.11	15
Los Angeles	.....	50.00	.....	9.00*b*	23.00	9.50*bg*	24.00*bg*	9.50*b*	.....	.025	.072	15
Minneapolis	.....	.....	2.30*d*	.....	27.70	.....	.126	.....	32.64	.....	.....	.....
Montreal	.....	.....	.....	16.60*k*	24.25*k*	.116*k*	.1485*k*	.115*hk*	.135*hk*	.08*k*	.135*k*	188
New Orleans	.....	.....	.....	13.50*a*	20.00*a*	.057	.088	.06*h*	.095*h*	.....	.080	.....
New York	.....	70.00	.....	17.40	24.20*p*	14.00	.....	.0725*h*	.1325*hp*	.....	.0725*p*	1225*p*
Philadelphia	140.00	58.00	4.06	15.00*r*	.....	14.00*r*	.....	.065*hr*	.....	.....	14.00*pr*	.....
Pittsburgh	135.00	38.75	.....	18.00	23.00	.09	.16	20.00	36.00	.07	.06	11
St. Louis	.....	37.00	.....	16.00	22.00	15.00*g*	21.00*g*	.0575*h*	.1213*h*	.648	.0525	1125
San Francisco	.....	40.00	.....	10.90	21.15	10.90*gr*	18.00*gr*	12.90	17.50*r*	9.50*gr*	.0525	1125
Seattle	.....	60.00*c*	.....	10.90*i*	19.40*i*	.....	20.40*gi*	11.40*i*	.....	10.90*i*	.0525*i*	0625*i*

‡ Delivered. *a* F.o.b. Baton Rouge. *b* Delivered to purchaser's warehouse. *c* 3½x4x8½ in. *d* 2½ in. 12-lb. treatment. *e* Local reduction due to 20% reduction intra-state class freight rates, only Georgia affected. *f* Mexican. *g* Per ton. *h* Per gallon. *i* F.o.b. Martinez. *j* 3x3½x8½ in. *k* Tax included. *n* Per thousand. † Available on priority only and quoted specially. *p* No steel drums shipments except to armed forces. *r* February 1943 prices, none later available

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masonry surfaces

with non-critical materials

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BUILDING MATERIALS DIVISION

Long Island City (1), New York

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WATERFOIL

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IRON AND STEEL PRODUCTS—BASE MILL PRICES

	STRUCT. SHAPES-PLATE	REINF. BARS ¼-in billet *b*	RIVETS ½-in. structural	WIRE NAILS Base *d*	SHEET PILING Base	STEEL RAILS Per Gross Ton: Standard	Light	Re-rolled	TRACK SUPPLIES: Angle Bars	Std. Spikes *c*	Tie Plates *c*	Track Bolts
Birmingham	$2.10	$2.15	$3.75	$2.55	.....	$40.00	$40.00	$39.00	$2.70	$3.00	$2.15	$4.75
Chicago	2.10	2.15	3.75	2.55	$2.40	40.00	40.00	39.00	2.70	3.00	2.15	4.75
Pittsburgh	2.10	2.15	3.75	2.55	2.40	40.00	40.00	39.00	2.70	3.00	2.15	4.75
Buffalo	2.10	2.15	.....	.....	2.40	.....	.....	.....	.....	.....	2.15	.....
Cleveland	2.10	2.15	3.75	2.55	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown	.....	2.15	.....	.....	.....	.....	.....	.....	.....	3.00	.....	.....
Detroit	.....	2.27‡	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gulf ports	2.47*a*	2.52*a*	.....	.....	2.85*a*	.....	.....	.....	.....	.....	.....	.....
Pacific ports	2.75*a*	2.80*a*	.....	3.05	2.95*a*	.....	.....	.....	.....	.....	2.30	.....

‡ Delivered. *a* F.o.b. cars dock. *b* Rail steel same as billet prices. *c* Other basing points include Portsmouth, O., Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., and Pacific coast ports, on tie plates alone, Steelton, Pa., on spikes alone, Lebanon, Pa., Richmond, Va. *d* Add switching charge $18 per ton.

IRON AND STEEL PRODUCTS—F.O.B. WAREHOUSE, PER 100 LB., BASE PRICE

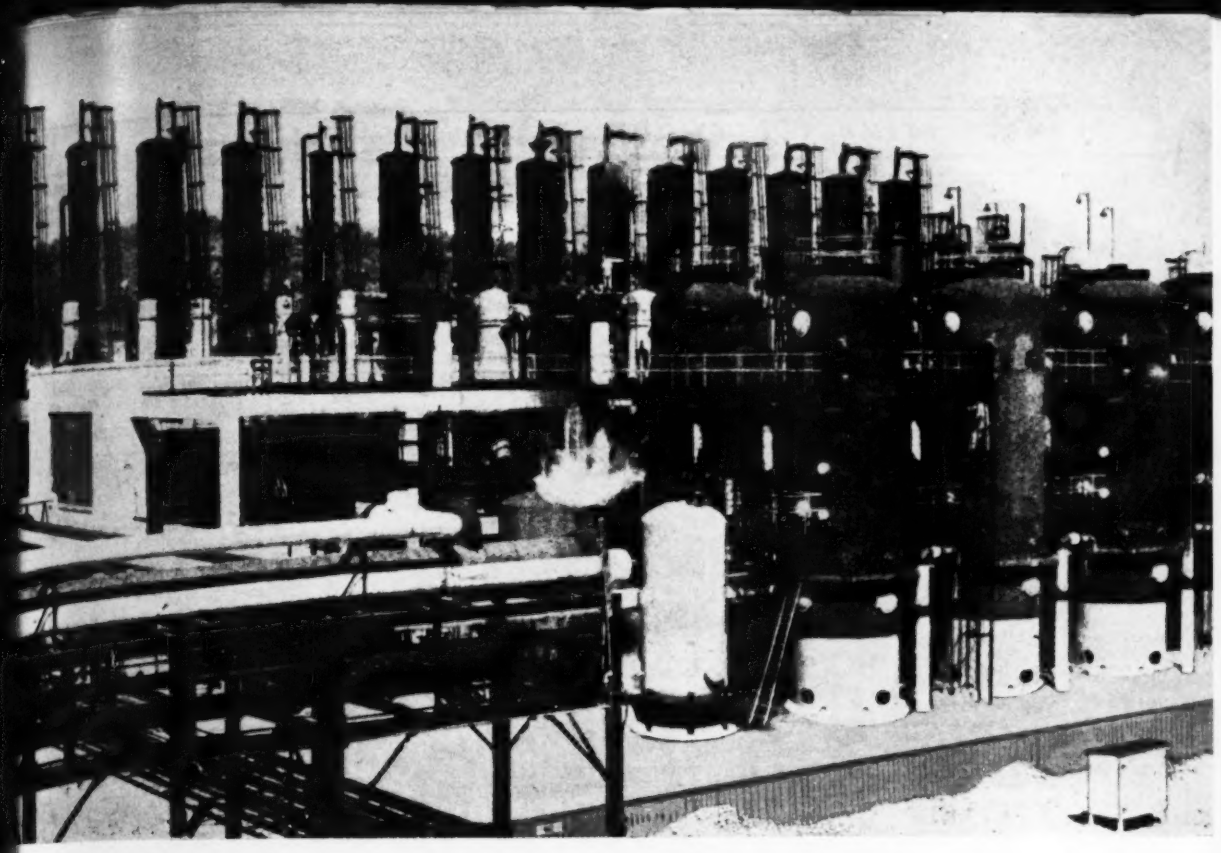
	STRUCTURAL SHAPES Per 100 lb. base price	REINFORCING BARS* Per 100 lb, ¾ in., base price: 15 tons or over *b* New billet	Rail steel	Add Switch	$/cwt. for Del.	EXPANDED METAL LATH Per 100 sq.yd., carload lots: Std. diamond mesh, 3.4 lb	Std. ribbed 3.4 lb.	WELDED FABRIC REINFORCING— Per 100 sq.yd., carload lots: 4x16 in., No. 5 & 10 wires	4x12 in., No. 8 & 12 wires	6x6 in. No. 6 & 6 wires Per sq. yd	SHEET PILING Per 100 lb. base price
Atlanta	$2.34	$2.39	$2.39	$.02½	$.10	$21.06	$23.00	$1.82	$1.35	$0.1719	$3.04
Baltimore	3.70	2.90	2.75	.....	.10	22.50	24.50	1.70	1.27	.1611	3.00
Birmingham	2.10*a*	2.15	2.15	.02½	.10	19.00	21.00	1.80	1.34	.1701	.....
Boston	3.85	3.51	3.36	$20 C.L.	.10	18.50	29.50	1.76	1.31	.1656	2.70
Chicago	2.10*a*	2.15	2.15	.03	.05	21.50	23.50	1.67	1.25	.1575	2.40
Cincinnati	3.68	2.53*cd*	2.53*cd*	.....	.05	19.50	21.50	1.66	1.25	.1568	.....
Cleveland	2.10*a*	2.15	2.15	.02½	.10	19.50	21.50	1.66	1.25	.1566	.....
Dallas	4.25	3.17	3.17	.....	....	25.00	27.50	1.93	1.42	.1827	.....
Denver	4.57	4.842	3.85	.....	....	26.50	28.50	1.97	1.45	.186	.....
Detroit	3.65‡	2.52‡	2.52‡	.....	.10	26.00	30.00	1.68	1.26	.1584	2.66
Kansas City	4.00	2.61*cd*	2.61*cd*	.0	.05	24.50	26.50	1.78	1.33	.1683	2.874
Los Angeles	3.65*f*	2.575	2.425	.02½	.05	23.00	27.50	1.93	1.42	.1827	3.65
Minneapolis	3.81‡	2.73	2.73	.0	.10	25.00	27.00	1.80	1.34	.1701	2.734
Montreal	4.00*i*	2.90*i*	2.80*i*	.....	....	26.00*hij*	33.00*hij*	2.56*i*	3.14*i*	.268*i*	.....
New Orleans	4.40	2.52	2.52	.05	.10	21.50	23.50	1.82	1.35	.1715	2.875
New York	3.75	2.76*c*	2.76*c*	.....	.15	17.50	19.50	1.76	1.32	.1665	2.74
Philadelphia	3.66	3.82	....	.....	....	19.50	21.50	1.71	1.28	.1611	2.72
Pittsburgh	2.10*a*	2.15	2.15	.02½	.10	23.00	26.50	1.59	1.20	.1503	2.40
St. Louis	3.697	2.74	2.74	.0	.05	28.00	34.00	1.69	1.27	.1602	2.70
San Francisco	4.35	2.825	....	.02½	.10	21.00	24.50	1.93	1.42	.1827	3.85
Seattle	2.75*e*	2.80*e*	....	.....	....	34.50	38.50	1.93	1.42	.1827	2.95*e*

‡ Delivered. *a* Mill prices. *b* 5–15 tons, add 15c. 1–5 tons, add 25c. Less than 1 ton, add 50c. *c* 20 tons or over Base. *d* Mill price plus freight. *e* F.o.b. dock. *f* Includes delivery in free delivery zone. *g* Less than 1 ton, add 25c.; 1 to 5 tons, add 10c. * High scrap steel prices cut former 15c. differences between re billet and rail steel in many mills. *h* List price. *i* Plus Dominion and Province sales tax. *j* August 1942 price; not on market.

PLUMBING, HEATING, WATER, SEWER AND DRAIN PIPE

	C. I. PIPE Per net ton f.o.b. 6 in. to 24 in.*a*	VITRIFIED SEWER PIPE Per foot, std. 8 in., s.s.	Delivered std. 12 in., s.s.	ASTM 24 in.,	C13–35 36 in.,	CLAY DRAIN TILE Per 1,000 ft., carload lots, f.o.b. 6 in.	8 in.	CONCRETE SEWER PIPE Per ft., delivered; ASTM 12 in.	C 14–35 24 in.	WROUGHT STEEL PIPE Full standard weight,*b* 1 to 3 in., Black %	Galv. %	Butt Weld 3½ to 6 in.: Black %	Galv. %	Lap Weld Galv. %
Atlanta	$49.66	$0.26*b*	$0.468*bc*	$1.8525	$4.68*c*	$85.00	$128.00	$0.45	$1.642	48.2	34.2	59.7	51.2	
Baltimore	53.00	.35	.60	2.65	7.25	160.00	200.00	.50	1.75	65.5	57.5	63.0	54.5	
Birmingham	45.00	.275	.495	1.95	5.50	100.00	220.00	.50	1.70	62.2	54.2	59.7	51.2	
Boston	55.40	.26	.463	2.07	5.85	140.00	.....	.60	.....	....	....	....	....	
Chicago	54.33	.35	.675	2.70	7.00	100.00‡	150.00‡	.45	1.85	66.0	55.0	64.5	53.0	
Cincinnati	53.27	.231	.4455	1.80	5.125	105.00	170.00	.60	1.70	57.1	43.4	54.0	39.6	
Cleveland	54.75	.196	.378	1.62	4.715	81.00	125.00	.30	1.60	68.5	57.5	66.0	54.5	
Dallas	56.43	.31	.58	2.25	5.00	90.00	110.00	.46	1.57	59.9	51.9	57.3	48.3	
Denver	61.56	.29†	.52†	2.16†	3.00*n*	125.00	200.00	1.00	2.22	58.4	50.4	55.7	47.2	
Detroit	54.75	.35	.675	2.70	7.75	100.00	175.00	.40	1.75	57.7	44.0	54.8	40.6	
Kansas City	55.73	.315	.39	2.20	5.86	140.00	260.00	.45	1.60	35.6	46.1	46.2	59.4	
Los Angeles	68.40	.282†	.508†	2.034†	5.085†	115.50	192.50	1.00	2.00	61.1	50.1	58.6	47.1	
Minneapolis	59.00	.275†	.495†	1.98†	5.37†	.....	.....	.90	2.10	64.2	53.2	60.7	49.2	
Montreal	60.00	.85*o*	1.50*o*	5.25*p*	8.50*ep*	45.00*m*	64.00*m*	.48*m*†	1.92*m*†	....	....	....	....	
New Orleans	51.78	.26	.48	1.69	.....	150.00	220.00	.45	1.65	62.4	54.4	58.8	50.3	
New York	52.40	.322	.621	2.61	6.65	.....	.....	.60	1.40	64.9	53.9	62.4	50.9	
Philadelphia	51.00	.30	.58	2.50	7.50	150.00	225.00	.45	1.75	56.6	42.8	53.6	39.1	
Pittsburgh	56.00	.245†	.4725†	1.845†	5.4325	97.80	154.20	.85*g*	2.00*g*	68.5*i*	57.5*i*	66.0*i*	54.5*i*	
St. Louis	52.84	.28	.504	2.016	4.50	85.00	220.00	1.00*j*	2.15*k*	56.4	42.6	52.5	38.4	
San Francisco	68.40	.3625*d*	.6525*d*	2.61	6.52	115.00	192.50	.58	2.34	45.0	31.0	41.0	26.0	
Seattle	70.20	.375	.675	2.70	6.75	84.00	187.50	.51*f*	1.44*f*	....	....	....	....	

‡ Delivered. †F.o.b. *a* B. & S. class B and heavier, C/L lots, 200 tons and over Burlington, N.J. (base) $49.00. Based on existing freight rates; subject to rate change. Gas pipe and class A, $3 per ton additional, 4 in., $3 per ton additional, 30 in. and larger usually $2 per ton less. *b* Double strength. *c* List to dealer. *d* List. *e* 30-inch. *f* Less 5% for cash. *g* Culvert pipe. *h* Discounts from standard list consumers carload prices, except Pittsburgh prices are f.o.b. mill. Base price $200 per net ton. List prices per ft.: ½ in., 8½c.; ¾ in., 11½c.; 1 in., 17c.; 2 in., 37c.; 2½ in., 58½c.; 3 in., 76½c.; 4 in., $1.09; 6 in., $1.92. 3 percent tax on transporation costs not included. *i* Applies also at Lorain, Ohio, mills. Chicago delivered base is 2½ points less on butt, 1½ on lap. Freight is figured from Pittsburgh, Lorain, O., Chicago Dist. Billing is from point producing lowest price at destination. WROUGHT IRON PIPE: Base price and list prices per ft. same as wrought steel pipe. Discount for Pittsburgh base: Butt-weld—1 in. and 1¼ in. black 34, galv. 16; 1½ in. black 38, galv. 18½; 2 in. black 37½, galv. 18. Lapweld—2½ in. to 3½ in. black 31½, galv. 14½; 4½ in. to 8 in. black, 32½ galv. 17. *j* Reinforced; spec. C 76–37. *k* Reinforced; spec. C 75–37. *l* Plus sales tax. *m* Tax included. *n* 27-in. pipe. *o* Less 50%. *p* Less 53%.



Work of 900,000 *men* . . .

There are two noteworthy facts about this plant: (1) it was the first synthetic rubber plant in production in the U. S. A., being completed many days earlier than expected (2) its 90,000 ton annual output is greater than the *natural* rubber production of 900,000 men.

In building this plant at record speed *dispersion* played an important part — dispersion of cement with Pozzolith — resulting in stronger, better concrete. Likewise in the production of synthetic rubber *dispersion* is a vital part of the process which is turning out a quality product in the shortest possible time.

Here are nine great synthetic rubber plants in which Cement Dispersion* — Pozzolith — reduced concrete construction time as much as 66% to help speed the delivery of urgently needed tires . . .

CARBIDE & CARBON CHEMICALS CORP.....(2 plants) Louisville, Ky. — Institute, W. Va.
STANDARD OIL COMPANY OF INDIANA.....Whiting, Indiana
SHELL OIL COMPANY.....Wood River, Illinois
SINCLAIR REFINING COMPANY.....Parco, Wyoming
CITIES SERVICE OIL COMPANY.....Lake Charles, Louisiana
UTAH OIL REFINING COMPANY.....Salt Lake City, Utah
B. F. GOODRICH COMPANY.....Port Neches, Texas
THE POLYMER CORP. LTD.....Sarnia, Ontario

Find out how Pozzolith can help you speed construction . . . reduce costs . . . improve concrete durability. Write or wire for illustrated booklet and complete information.

THE MASTER BUILDERS COMPANY

CLEVELAND 3, OHIO TORONTO, ONTARIO

Other Master Builders Products employing Cement Dispersion which are serving the Construction Industry to produce faster, better, more economical results: MASTERPLATE for heavy duty floors; EMBECO for non-shrink concrete grouts and repairs; OMICRON MORTARPROOFING for masonry mortars

MASTER BUILDERS

LUMBER, TIMBER PLYWOOD—PER M FT., B.M., CARLOAD LOTS F.O.B.

	SHORT LEAF YELLOW PINE AND DOUGLAS FIR — All S. L. Y. P. is No. 2 common or better and for No. 1 N. C. Box. (Prices in Bold Face) *All Fir planks No. 2 common, Fir timber is No. 1 common. Lengths up to 20 ft. (Prices in italics)*								LONG LEAF Y. P. Merchantable grade up to 20 ft.		PLYWOOD Rail freight increment (See note for base price)	
	1x6 S4S	1x8 S4S	2x4 S4S	2x6 S4S	2x8 S4S	2x10 S4S	3x12 Rgh	6x12 Rgh	12x12 Rgh	2x12 Rgh	12x12 Rgh	¼" ⅜"
Atlanta	$37.00	$37.00	$32.00	$31.00	$31.00	$34.50	$49.00	.....	.....	$58.00	$66.00	$17.90 $21.85
Baltimore	42.00	45.00	42.00	42.00	43.00	48.00	65.00	.....	.....	115.00	120.00	18.25 22.25
	48.00	*48.00*	*55.00*	*55.00*	*55.00*	*55.00*	*68.00*	*$70.00*	*$70.00*	.....	.....	....
Birmingham	34.50	36.50	32.00	32.00	34.00	34.00	53.00	53.00	56.00	.....	.....	17.35 21.15
[1]	37.50	37.50	37.00	37.00	37.00	43.00	65.00	.....	.....	67.50	70.00	....
Boston ‡*	42.00[3]	45.00[3]	55.00[3]	60.00[3]	60.00[3]	65.00[3]	75.00[3]	.....	.....	85.00[3]	.....	18.25 22.25
‡*	*50.00*	*50.00*	*55.00*	*60.00*	*65.00*	*70.00*	*80.00*	*85.00*	*85.00*	.....	.....	....
Chicago	50.00	51.00	47.00	46.00	47.00	48.50	67.00	.....	.....	80.00[2]	95.00[2]	14.60 17.80
	50.00	*50.00*	*47.50*	*47.00*	*47.00*	*48.00*	*57.00*	*56.00*	*59.00*	.....	.....	....
Cincinnati	41.00	42.50	39.00	40.50	42.00	43.00	53.00	.....	.....	65.00	68.00	17.35 21.15
	.....	.....	.....	.....	.....	.....	*55.50*	*55.50*	*55.50*	.....	.....	....
Cleveland	42.50[k]	42.50[k]	52.50[k]	51.00[k]	65.00	65.00	83.00	83.00	83.00	.....	.....	17.75 21.60
Dallas e	41.50	42.50	38.50	37.50	37.50	38.50	53.50	53.00	53.00	78.00	83.00	14.60 17.80
Denver ‡	64.00[4]	62.00[4]	65.00[4]	65.00[4]	65.00[4]	66.00[4]	69.00[4]	*83.00*	*89.00*	.....	.....	10.45 12.70
Detroit	61.00	61.00	57.75	57.75	57.75	62.75	72.75	.....	.....	70.75	78.00	17.35 21.15
	.....	.....	.....	.....	.....	*63.75*	*71.00*	*75.00*	*75.00*	.....	.....	....
Kansas City a	64.00	64.00	62.00	60.50	62.00	64.00	79.00	.....	.....	79.00	89.00	12.60 15.40
	60.00	*60.00*	*58.00*	*58.00*	*58.00*	*58.00*	*75.00*	*80.00*	*80.00*	.....	.....	....
Los Angeles a	*58.50*	*58.50*	*58.50*	*59.00*	*60.25*	*60.25*	*75.75*	*74.25*	*74.25*	.....	.....	9.90[gh] 12.05[gh]
Minneapolis b	59.00[5]	59.00[5]	.....	.....	.....	.....	.....	.....	.....	.....	.....	12.60 15.40
‡	*55.50*	*55.50*	*54.25*	*54.50*	*53.50*	*54.75*	*64.75*	*63.50*	*63.50*	.....	.....	....
Montreal †[7]	*52.00*	*55.00*	*48.00*	*52.00*	*54.00*	*60.00*	.....	.....	.....	200.00	200.00	....
	42.50	*42.50*	*45.25*	*45.25*	*45.25*	*46.75*	*50.00*	*50.00*	*50.00*	.....	.....	....
New Orleans	37.50	37.50	32.50	31.50	31.50	35.00	46.00	.....	.....	52.50	69.00	14.60 17.80
	31.00	*31.00*	*33.00*	*31.00*	*34.00*	*32.00*	*33.00*	.....	.....	.....	.....	....
New York	60.50	61.50	56.25	55.25	56.25	59.50	67.50	.....	.....	120.00[f]	125.00[f]	18.35 22.25
‡	.....	.....	*65.00[i]*	*65.00[i]*	*65.00[i]*	*65.00[i]*	[Range from $75 to $95]			.....	.....	....
Philadelphia	65.00	63.00	62.00	61.00	61.00	64.00	84.00	.....	.....	126.00	122.00	18.25 22.25
	[*$70.00 to $85.00*]		*75.00*	*75.00*	*75.00*	*75.00*	*77.50*	*$85 to $105*	*$85 to $105*	.....	.....	....
Pittsburgh	50.80	53.20	62.75	55.00	60.85	62.50	76.25	.....	.....	.....	.....	18.10 22.05
	69.20	*68.10*	*66.10*	*65.30*	*65.20*	*65.65*	*88.75*	*88.75*	*88.75*	.....	.....	....
St. Louis ‡c	56.00	52.00	53.00	52.00	53.00	56.00	69.00	*75.00*	*75.00*	86.00	85.00	14.60 17.80
San Francisco d	*36.00*	*36.40*	*34.00*	*34.00*	*33.25*	*33.25*	*39.00*	*38.25*	*38.75*	.....	.....	7.30[g] 8.90[g]
Seattle	*35.00*	*35.00*	*35.00*	*35.00*	*35.00*	*35.00*	*40.00*	*40.00*	*40.00*	.....	.....	0.00 0.00

Bold Face type, Southern Pine. *Italics, Douglas Fir.* [1] Long leaf. [2] Roofers' N. C. Pine. [3] Spruce. [4] Native. [5] Western Pine, No. 3 Common. [7] Spruce. [6] Norway Pine. ‡ Delivered. *a* Yard prices. *b* Contractors discount in Minneapolis and St. Paul discontinued May 21, 1938. *c* 5M ft. or less. *d* F.o.b. cars San Francisco freight rate. *e* 10% discount taken off. *f* Up to 18 ft. † Plus sales tax. * Prices for truck delivery; no longer quoting carload lots f. o. b. city.

Note: Special concrete form grade Fir Plywood, 4' by 8' panels, 5-ply, sanded 2 sides, water resistant glue, carload lots, delivered per 1,000 sq. ft. surface. Seattle base price on ⅝", $95.15; on ¾", $104.85; price includes oiling and sealing charges. For other centers add rail freight increment from table or proper size. For resin dipped treatment, add $10.50 per M. *g* Lower rate by water shipment. *h* 50,000 lb. minimum. *i* Ranges from $65 to $69. *j* Average price *k* August price. *l* September price; none later available.

GLASS, EXPLOSIVES, CHEMICALS

	WINDOW GLASS — Discounts from jobbers list, Aug. 15, 1938 Single or Double Thickness A quality	B quality	EXPLOSIVES — Per lb. 40% Ammonia Gelatin in 50-lb. cases delivered in 200 lb. lots*
Atlanta	75%	75%	$0.15
Baltimore	78%	79%	.15
Birmingham	76%	76%	.105
Boston	77%	78%	.15
Chicago	77%	77%	.15
Cincinnati	77–10%	77–10%	.15
Cleveland	77–10%	77–10%	.19
Dallas	76%	76%	.1625
Denver	76%	76%	.155*e*
Detroit	77%	77%	.1575
Kansas City	76–10%	76–10%	.155
Los Angeles	86%*d*	88%*d*	.1575
Minneapolis	77%	77%	.155
Montreal	40–5%‡	47%‡	.1675†
New Orleans	70%	75%	.16
New York	81%	82%	.22*f*
Philadelphia	78%	79%	.15
Pittsburgh	79%	79%	.1225
St. Louis	77–10%	77–10%	.155
San Francisco	66%	73%	155
Seattle	75%	75%	.1575†

Price of 60% Ammonia Gelatin is $0.01 per lb higher than 40%

a Disc. from list Sept. 1939. *b* Also less 6% tax exemption. *d* Discount from jobbers' list Sept. 15, 1928. ‡ Sales tax included.

* Urban prices influenced by service charges or local storage and delivery regulations, do not consistently reflect quantity prices in less congested areas. *e* F.o.b. Louviers, Colo. *f* In boroughs of Kings, Queens and Richmond, and in Manhattan south of Canal Street, add delivery charge of $6.00 per trip. † F.o.b.

40% Ammonia Gelatin price ranges in other than urban areas, per lb. (except Seismograph Grades)

	C/L 20,000 lb. net	Tons	200 lb. lots
E. of the Miss., except Fla. and Me.	$0.105	$0.13	$0.15
W. of Miss. to Rocky Mtn. States, Fla. and Maine	.11 –.1175	.135 –.1475	.155 –.1675
Rocky Mtn. States	.11 –.1225	.135 –.1525‡	.155 –.1725‡
Pacific N. W. States	.1075–.12	.1375–.15	.1575–.17
Pacific S. W. States	.1050–.1125	.135 –.1425	.155 –.1625

‡ F.o.b. Louviers, Colo., or Butte, Mont.

PILES, TIES—F.O.B.

PILES

Prices per linear foot, fir and pine, bark on, f.o.b. cars, New York. Fir based on Wash. and Ore. points to New York shipping area; pine based on freight from Norfolk.

Dimensions	Points	Length	By Rail — Pine	Fir
12-in. at butt	6-in.	30 to 50-ft.	$0.33	...
12-in.— 2-ft. from butt	6-in.	50 to 59-ft.	.34	...
12-in.— 2-ft. from butt	6-in.	60 to 69-ft.	.35	...
12-in.— 2-ft. from butt	6-in.	90 to 100-ft.	....	.50
13-in.— 3-ft. from butt	5-in.	91 to 100-ft.	....	.54
14-in.— 2-ft. from butt	6-in.	50 to 69-ft.	.40	.48
14-in.— 2-ft. from butt	6-in.	70 to 79-ft.	.41	.52
14-in.— 2-ft. from butt	5-in.	80 to 85-ft.	.52	...
14-in.— 2-ft. from butt	5-in.	85 to 89-ft.	.55	....
14-in.— 2-ft. from butt	5-in.	90 to 100-ft.	....	.555

RAILWAY TIES

Prices f.o.b., per tie for carload lots:		6"x8"x8' Untr.	6"x8"x8' Tr.	7"x9"x8'6" Untr.	7"x9"x8'6" Tr.
Boston	Oak	$1.50	....	$2.00	....
	Pine	2.00	$3.00*a*	2.50	$3.50*a*
New York	S. L. Sap Pine	1.43/1.54	2.59	1.76	2.88
	Mixed Oak	1.71	2.59	2.42	2.88
Birmingham	White Oak	1.00	1.60*a*	1.30	2.25*a*
Chicago	Red Oak	...	2.19*a*	....	2.87/3.00*a*
Los Angeles	Douglas Fir	1.10	1.75*a*	1.60	2.50*a*
Philadelphia	Red Oak	....	2.10*ag*	....	3.25*ag*
St. Louis	White Oak	1.48	....	2.04	....
	Red Oak	1.48	2.05*a*	2.04	2.83*a*
	Sap Pine or Cypress	1.35	....	1.91	....
San Francisco	Douglas Fir	1.25*bef*	....	....	3.00*ef*
Montreal	Birch or Maple	.85	.95	....†	....†

Tr.— Treated; Untr.— Untreated. *a* Creosoted *b* 6"x8"x8'6". *c* Empty cell. *d* Zinc. *e* Green. *f* F.o.b. cars. † Out of market. *g* January price, none later available.

CHEMICALS

Water, sewage treatment, road work, f.o.b. carlots, New York

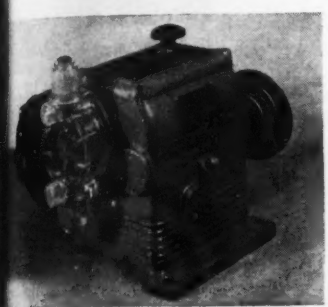
Bleaching powder, in drums, f.o.b. works, per 100-lb	$2.50- 3.10
Chlorine cylinders, liquid, per lb. delivered	0525
Calcium chloride, 77–80%, flaked, 100-lb. paper bag, del'd. ton	18.50-35.00
Silicate of soda, 52 deg., in drums, f.o.b. works, per 100 lb	1.40
Soda ash, 58%, in paper bags, per 100 lb. dense	1.55
Sulphate of aluminum, commercial, in 100-lb. bags, per ton	23.00-25.00
Sulphate of copper, in bbl., per 100-lb	5.00

NEW AIDS TO THE CONSTRUCTOR

Heavy-Duty Feeder

Incorporating the suggestions of more
n a thousand men, many new features
aracterize the heavy-duty Chem-O-
eder. This feeder is a positive-displace-
nt, diaphragm-type pump, suitable for
eding practically all chemical solutions
ed in water or sewage treatment against
sitive pressures of up to 85 lb. psi., or
o low or negative pressure, such as
mp suction.

Some of the outstanding features of
e feeder include: a "See-Thru," trans-
rent plastic moulded pump head, im-
rvious to chemical corrosion, with
ilt-in sight feed domes, visible check
lve operation, and a patented, fabric-
inforced diaphragm; standard ⅙-hp.
ectric motor, mounted on a swing base;



dosage calculator for hypochlorination,
hich tells how to make up solutions and
w to set feeder for proper stroke length
d rate; chemical feed selection knob
d visual stroke-length indicator; V-belt
ve, allowing three separate stroking
tes in addition to full stroke length
justment; unit frame, giving great
gidity and strength; and an oil bath.—
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• • •

Pocket Pipe Gage

Although only pocket size, the recently
nounced Three-Point pipe gage gives
stantaneous measurements of pipe from
in. to 12 in. It consists of two pivoted
el plates, with edges curved at three
nts for contact with the pipe, and a
le which automatically registers in-
le-diameter pipe size and drill size for
pping.

According to the manufacturer's state-
ent, the gage measures by determining
e outside arc of the pipe at three points
contact. Only a small section of pipe
ntour is needed for the contact, and

Free! A Sample Pencil

attach this coupon to your business letterhead

EBERHARD FABER PENCIL CO.
37 Greenpoint Ave., Brooklyn, N.Y.
Please send me a_____degree MICROTOMIC "VAN DYKE" with HI-DENSITY Lead.

Name_____

Position_____

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For Tracings You'll be Proud to Initial!

HI-DENSITY Lead will produce tracings of OPACITY beyond your previous experience—and clearer, sharper blueprints. Your drafting skill will immediately perceive the advantages of a MICROTOMIC VAN DYKE Drawing Pencil... and you'll delight in its smoothness, uniformity of grading and notably longer wearing qualities. We suggest you clip the coupon, and investigate HI-DENSITY Lead.

MICROTOMIC
VAN DYKE
DRAWING PENCILS

The Eberhard Faber Drawing Pencil with the MICROTOMIC Lead... 18 Degrees... and 6 also with Chisel Points.

HI-DENSITY LEAD

STRUCTURAL CLAY BUILDING TILE, BRICK AND LIME—DELIVERED

	STRUCTURAL CLAY TILE—PARTITION—SCORED Per M. lots of 2,000 pieces or over, 3x12x12 in.	4x12x12 in.	8x12x12 in.	STRUCTURAL CLAY TILE—LOAD BEARING—SCORED Per M. lots of 2,000 pieces or over, 8x12x12 in.	10x12x12 in.	12x12x12 in.	BRICK Per M. in quantity, Common backing	Straight hard	LIME Per ton, Hydrated finishing	In paper, Common hydrated	Carload, Pulverized or lump
Atlanta	$104.00	$114.00	$199.00	$234.00	$244.00	$250.00	$13.50	$18.04	$26.54	$15.04	$15.04
Baltimore	84.00	90.00	170.00	200.00	260.00	320.00	15.00*k*	19.00*k*	18.00	13.00	2.90
Birmingham	80.00	85.00	160.00	191.00	252.00	288.00	14.50	17.00	18.11	13.64	2.25
Boston	89.35*a*	93.30*a*	178.70*a*	202.50	271.80	308.70	16.50*i*	19.50*i*	17.50†	12.50†	14.92†
Chicago	72.00	77.00	145.00	197.60	243.00	278.00	12.50	13.50	17.00	15.00	12.30
Cincinnati	65.55	69.90	131.20	148.70	210.35	240.45	22.0*c*	22.00	15.50	13.00	.....
Cleveland	60.00	64.00	120.00	144.00	193.00	221.00	17.00	17.00	15.75*j*	13.25*j*	3.00
Dallas	62.50	67.50	135.00	162.00	212.50	263.00	13.50*i*	15.00*i*	19.00	15.00	.95
Denver	84.80	95.40	153.70	178.20	212.00	227.90	14.50	18.00	25.00*j*	17.00*j*	20.00
Detroit	86.05	91.80	172.10	213.00	268.00	330.00*e*	20.00	21.00	18.00	16.00	16.00
Kansas City	67.00	69.00	89.00*c*	128.00	163.00	189.00	15.00	16.00	19.32	13.00	10.92
Los Angeles	73.50†*r*	89.50†*r*	128.00*c*†*r*	210.00†*r*	368.00†*r*	460.00†*r*	13.50	15.00	16.50	17.50	17.50
Minneapolis	81.95*b*	87.40*b*	148.70*b*	.....	179.30*b*	249.35*b*	13.60	15.60*g*	21.00	16.00	19.00
Montreal	99.10*a*	105.65*a*	154.75*a*	104.65*au*	154.75*au*	155.25	24.16†*u*	27.25†*u*	24.60*u*	18.00*u*	.....
New Orleans	72.00	72.00	135.00	162.00	210.00	260.00	14.00	.....	18.30	12.08	14.10
New York	78.40	83.60	115.00*e*	193.30*h*	238.80*h*	295.60*h*	16.00/17.00	.....	20.00	14.00	17.00
Philadelphia	85.30	91.00	170.50	186.30	235.00	261.10	17.00	20.00	19.00	13.00	15.00
Pittsburgh	62.35	66.55	124.75	140.25	173.25	198.00	17.50	19.50	17.90	15.40	2.55
St. Louis	67.00	95.00	130.00	190.00	244.00	290.00	18.00	17.00	22.00	18.00	2.56
San Francisco	96.00	108.00	144.00	.....	.....	.....	19.00	.....	24.00	23.00	2.56
Seattle	115.00	125.00	230.00	.....	.....	.....	20.00*f*	21.00*f*	20.00*s*	20.00*s*	20.00

† F.o.b. *a* Smooth. *b* Carload lots delivered to job. *c* 6x12x12 in. *d* Not load bearing. *e* 48 lb. tile. *f* Less $1.00, ½ cash 15 days, balance 30 days. *g* Selected common. *h* F.o.b. Perth Amboy, N. J. *i* F.o.b. Warehouse only. *j* LCL. *k* $1.00 discount if paid in 10 days. *l* Lump. *m* Per bbl., 180 *n* Per sack 100 lb. *o* Per bbl., 200 lb. *p* 280 lb. bag. *r* 5% discount 10 *s* 2% discount for cash. *t* 5½x8x12. *u* 8% sales tax included.

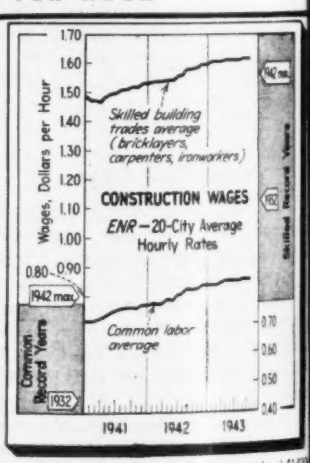
PAINT, ROOFING—F.O.B. CARLOAD LOTS

	RED LEAD Per 100 lb. in 600-lb. (Approx.) bbl. Dry *a*	WHITE LEAD Per 100 lb. in oil	READY-MIXED PAINT Per gal., drums Graphite *b*	Aluminum *b*	Ferric Oxide *d*	ROOFING SUPPLIES Carload lots f.o.b. factory Rolls, slate surfaced, 85–90 lb. per sq.	Asphalt felt, per 100 lb.	Tar felt, per 100 lb.	Asphalt coating per gal.	Tar pitch 350 lb. bbl. per ton
Atlanta	$10.25	$14.125	$1.30	$2.25	$1.20	$1.90	$1.61	$1.61	$0.27	$29.00
Baltimore	10.00	13.75	2.00	3.00	2.50	2.30	2.70	2.70	.40	29.00
Birmingham	10.25	14.125	2.35	3.50*r*	1.98*r*	2.04	1.97	1.97	.32	28.25
Boston	10.00	13.75	1.60	....	2.40	2.12‡	1.72*h*‡	1.72*h*‡	.50‡	21.00‡
Chicago	10.00	13.75	....	....	....	1.75*hf*	1.74*hf*	1.82*hf*	.33*f*	23.00*f*
Cincinnati	10.00	13.75	1.70	2.90	1.60	2.40	2.39*h*	2.39*h*	.36	21.00
Cleveland	10.00	13.75	2.10	2.90	1.95	1.93	1.83*h*	1.83*h*	.35	29.00
Dallas	10.00	14.50	1.88	2.11*n*	.05‡	1.75*h*	1.66*h*	1.66*h*	.35	30.00
Denver	10.50	14.25	1.65	14.25*k*	.27‡	2.45	3.15	3.15	.35	28.00
Detroit	10.00	13.75	1.75	3.00	1.60	2.10	2.16	2.16	.50	23.00
Kansas City	10.00	13.875	2.39*g*	2.55*gr*	2.16*g*	2.10	2.30	2.30	.28	27.50
Los Angeles	10.25	14.25	1.60	2.25	2.30	2.10	1.50	....	.45	.....
Minneapolis	10.00	13.875	....	....	....	1.75*i*	1.66*hi*	1.66*hi*	.32	23.00
Montreal	9.25	6.25	2.50*p*	4.90*p*	3.15*p*	2.67	2.47	2.07	.94	1.85*n*
New York	10.00	13.75	2.03	....*r*	1.64	1.66	1.58*h*	1.58*h*	.26	25.00
Philadelphia	10.00	13.75	1.60/1.80	2.20*r*	1.55	1.75	1.66	1.66	.32	23.00
Pittsburgh	10.00	13.75	1.05	1.95	.80	1.95	1.94*h*	1.94*h*	.34	26.00
St. Louis	10.00	13.75	2.28*s*	2.89*s*	1.96*s*	1.66	1.66	1.66	.29	22.00
San Francisco	10.25	14.00	1.80	2.75*m*	1.35	1.71	2.40	2.40	.33	19.50
Seattle	10.25	14.25	1.90	3.00	....	2.15	2.16*h*	....	.35	26.50*j*

‡ Delivered. Note: Red lead in oil 50c. higher than white lead in oil. *a* Red lead prices change frequently due to pig lead price changes. *b* U. S. War Dept. Spec. 3-49A. *c* ASTM Spec. D266-31. *d* 80% minimum ferric oxide. *e* Subject to 25% discount. *f* Distributors' price to contractors. *g* 5 gal. can. *h* Per roll, 65 lb. *i* Minneapolis and vicinity. *j* Asphalt pitch. *k* Per 100 *l* Per lb. *m* Per bbl. *n* May, 1941 price, no later quotation available. *p* 8% sales tax. *r* Not available, except on priority rating; then quoted special *s* December price.

SKILLED AND COMMON WAGE RATES—PER HOUR

	Bricklayers	Carpenters	Struct. Iron Workers	Hoisting Engineers	Plasterers	Common Labor Building	Common Labor Heavy Const.
Atlanta	$1.50	$1.25	$1.50	$1.25	$1.50	$0.40	$0.50
Baltimore	1.75	1.375	1.80	1.625/1.80	1.50	.75	.75
Birmingham	1.75	1.25	1.50	1.25/1.50	1.50	.65	.65
Boston	1.625	1.50	1.65	1.875	1.667	.80/1.00	.80/1.00
Chicago	1.75	1.70	1.76	1.75	1.825	1.10	1.10
Cincinnati	1.75	1.50	1.675	1.45/1.60	1.625	.85	.85
Cleveland	1.875*c*	1.55	1.75	1.75	1.75	1.00/1.25	1.00/1.25
Dallas	1.625	1.25	1.50	1.75	1.625	.60	.75/1.25
Denver	1.65*b*	1.50*b*	1.50*b*	1.50*b*	1.65*b*	.80*b*	.80*b*
Detroit	1.675	1.50	1.75	1.625/1.75	1.675	.90	.90
Kansas City	1.65	1.50	1.625	1.625	1.65	.90	.90
Los Angeles	1.50	1.35	1.625	1.375	1.667	.875	.875
Minneapolis	1.50	1.375	1.50	1.40	1.50*e*	.925	.925
New Orleans	1.50	1.25	1.50	1.50	1.375	.65	.75
New York	2.00*b*	1.85*b*	2.00	2.00*b*	2.00*b*	1.031	.95
Philadelphia	1.90	1.50	1.90	2.00	2.00	.825	.825
Pittsburgh	1.90	1.75	1.75	1.8125	1.875	.90	.80
St. Louis	1.75	1.50	1.75	2.00	1.75	.95	.95
San Francisco	1.875	1.50	1.75	1.50/1.75	1.75	.95	.95
Seattle	1.78	1.48	1.68	2.00	1.78	1.08	1.10
Montreal	.92	.81	.90	.76	.90	.46	.53



ENR Skilled Average; (Bricklayers, Carpenters, Ironworkers) $1.63
ENR Common Average; $0.869

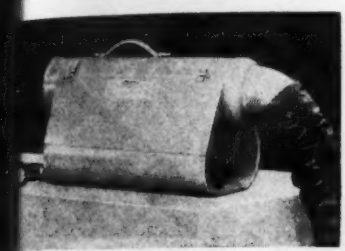
b 7 hr. day. *c* Prevailing rate on government work. *e* 30 hr. wk.

gage will measure pipe in any posi-
n, even against a wall or in a corner.
e gage will also measure a covered
e if there is a small opening near a
ion or other fitting, and, it is claimed,
e gage may be applied in a dark place
d taken to the light for reading. It is
ly 2½ x 4¼ in. when closed, and costs
50.—*Three-Point Gage Co., 3821 oadway, Chicago, Ill.*

• • •

Engine Heater

Winter operation of heavy-duty equip-
nt will be speeded up and economical
hen a new, compact, preheating unit is
ed, its manufacturer claims. The heater,
ough it weighs only 38 lb. and can be
rried around like a suitcase, produces
,000 Btu. of heat per hour, and utilizes

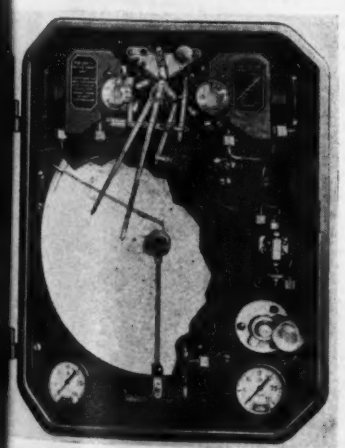


percent of all the heat units in the
rning gasoline it uses for fuel. Much
otor wear will be eliminated when this
ater is used, it is stated, and a booklet
scribing its commercial applications
ill be sent upon request.—*York Heat ivision of Thos. Shipley, Inc., York, Pa.*

• • •

Pneumatic Set Controller

An increased demand for a dependable
ntroller, with control point automatic-
ly adjusted by variations in output air
essure from another remotely located
strument, has been met by a new pneu-
atic set controller, the manufacturer
ates. This instrument, developed in



th indicating and recording forms, is
ndamentally a Fulscope controller with

Correctly Conditioned Water for Every Industrial Process
Take advantage of Refinite's 26 years of "know how" in water conditioning. Our laboratories and technical staff invite your special water problems. Refinite equipment includes the latest development in clarification, filtration, iron removal, zeolite and lime softening, ionic exchangers, condensate oil removal, pH control, taste, odor, and color removal, etc.

THE REFINITE CORPORATION
Write for free catalog **102 Refinite Bldg., Omaha, Nebr.**

YOU receive Clinton Fabric in rolls or sheets already cut to your *exact* specifications. No time or expense on the job. Furthermore, its UNIFORMITY saves and gives higher performance standards. The tensile of the wire and the strength of the welds do not vary. To achieve this we make our own steel, draw the wire and weld under expert supervision. These cost-cutting and quality features have made Clinton Fabric first choice for exacting circular reinforcement jobs.

CLINTON
Electrically Welded
REINFORCING FABRIC

WICKWIRE SPENCER STEEL COMPANY
500 Fifth Avenue **New York, N. Y.**

To Tokio—VIA ALASKA

WITH
THORNTON FOUR-REAR-WHEEL DRIVES

NOBODY KNOWS THE DATE, but just as sure as there are 130,000,000 determined Americans, the big push for Tokio will some day, before very long, be under way. When that time comes, the Alcan Highway will be of vital importance.

Playing a big and important part in this history-making traffic will be more than 1,000 trucks equipped with THORNTON Four-Rear-Wheel DRIVE. Hundreds of trucks equipped with these units proved themselves a year ago by playing a big part in the construction of the highway. Their outstanding record has led to orders for hundreds more.

THORNTON Four-Rear-Wheel DRIVE unit, which places two driving axles under the load instead of one . . . more than doubling the capacity of the truck and providing tremendous tractive ability for difficult operations, either on or off the highway.

THORNTON TANDEM COMPANY

8701-8779 GRINNELL AVE. - - - DETROIT, MICH.

Manufacturers also of the THORNTON Automatic-Locking DIFFERENTIAL

"When you need TRACTION you need THORNTON"

additional unit to convert changes in input pressure into linear movements the set pointer.

The magnitude of the linear set pointer vement per pound change in input air ssure is governed by the setting of the ustment dial provided in this unit. e unit also provides for set pointer justments in either direction for an rease in input air pressure, and for iting the travel of the set pointer hin given limits. The instrument is o equipped with a manual set pointer justment feature. — *Taylor Instrument P. O. Box 110, Rochester 1, N. Y.*

• • •

Carboloy Scraper

Prime cause for the development of a scraper, tipped with cemented car-e, was the need for speed in produc- machine tools. This scraper finishes s and slides quickly and accurately, manufacturer points out. On flame-ted cast iron with a Rockwell "C" dness of close to 40, for example, it is sible to finish 25½ sq. in. per grind h the carbide scraper. A further test wed that best results on any material m 10 to 32 "C" scale hardness were ained with the carbide-tipped tool, ich was free of any tendency to scratch dig into the surface.

The new scrapers are made with spe- steel handles strong enough to with-nd pressure without deflecting or ding.—*Carboloy Co., Inc., Detroit 32, ch.*

• • •

"Welder" Riveting

A machine that looks like a spot-der (developed, in fact, by builders of istance welding equipment) is used in riveting of stamped assemblies, it is med. Equipped with an indexing table, machine hot-upsets and rivets in place es of hydraulic flywheels. The vane s stick through holes in the faces of embly rings, and "electrodes" are ught against them under pressure, ting and upsetting the ends to rivet parts securely. — *Progressive Welder Detroit, Mich.*

• • •

Backrest Extension

Increased load support and less possi-ty of shift while loads are being dled result from the use of a new riage backrest extension, according to manufacturer's statement. This all-l, all-welded extension is quickly ched by inserting its permanently ched pins into sockets welded to the ndard lifting carriage; it is removed merely lifting it from the supporting kets.

Extensions are available to increase

Communications
AS MODERN AS AT HOME
At war, code messages flash between advanced posts and control centers. For speed and accuracy, teletypes are used, their vital electric power supplied by gasoline engine-driven generators. Another of the hundreds of uses for the hundreds of thousands of dependable Briggs & Stratton 4-cycle, air-cooled gasoline engines now serving our armed forces.
Our experience gained in meeting new production highs—and, at the same time, constantly maintaining Briggs & Stratton standards for precision, quality, durability and economy—will be equally important and advantageous when we again resume peacetime production.
Our customers, and the owners and users of Briggs & Stratton gasoline engines, will find an even "improved" service and a "better" product, to maintain our recognized position as builders of "*the world's finest air-cooled gasoline engines.*"
Can we help you now, on present wartime needs, or post-war planning?
"It's powered right — when it's powered by Briggs & Stratton."
BRIGGS & STRATTON CORP.
MILWAUKEE 1, WIS., U. S. A.
ENLIST YOUR DOLLARS
BUY WAR BONDS
4 CYCLE
BRIGGS & STRATTON
GASOLINE ENGINES

Prompt Delivery

ON THESE WESTINGHOUSE WELDERS

Need a-c or d-c arc welding machines? Westinghouse offers any of the models shown on this page for *immediate delivery*.

Westinghouse A-C Arc Welders boost welding speeds from 15 to 30 per cent . . . because arc blow is eliminated; heavier electrodes can be used; no "time-outs" for maintenance are necessary.

Westinghouse D-C Flexarc Welders, with new Arcontrol, are the favorite of welding engineers and operators everywhere. Just one simple adjustment gives the welding current desired . . . and Arcontrol offers choice of three types of arc.

For quick delivery or more information, call your Westinghouse distributor or Westinghouse office.

J-90477

FOR HEAVY-DUTY, PRODUCTION WELDING

A-C Welder Model WC-3C—500 amperes. Infinite number of current settings from 100 to 625 amperes.

FOR HEAVIER THAN AVERAGE WORK

A-C Welder Model WC-2C—300 amperes. Infinite number of current settings from 60 to 375 amperes.

FOR ALL-PURPOSE WELDING

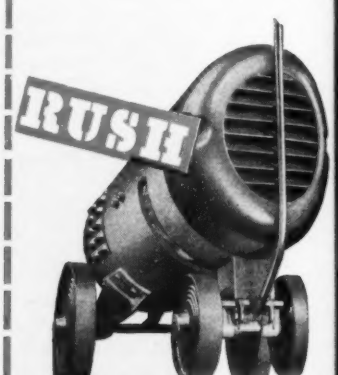
A-C Welder Model WT-4C—200 amperes. Has 27 different current settings from 20 to 250 amperes.

FOR MAINTENANCE AND LIGHT WORK

A-C Welder Model WT-1C—100 amperes. Has 15 current settings from 20 to 140 amperes.

FOR UNIONMELT* WELDING

Westinghouse A-C Welders for use with the Unionmelt Process available in 500, 750, 1,000 and 1,500-ampere models.



300-AMPERE FLEXARC D-C WELDER

New single preset current adjustment plus ARCONTROL. No exciter, rheostat or reactors to fiddle with.

*Registered trade-mark of The Linde Air Products Co.

Westinghouse WELDERS

PLANTS IN 25 CITIES... OFFICES EVERYWHERE

riage backrest height from 48 to 72 hes above forks. — *Towmotor Corp., 26 East 152nd St., Cleveland, Ohio.*

• • •

Fire Shield

Designed for maximum protection from at and for easy maneuverability, a new e shield fills a long-felt want, the manuturer claims. The Foamite shield, of eet steel reinforced with strong angle ons, has a 1-in. thick insulating mineral ol blanket, capable of withstanding

200 deg. F., between front and back ates. Observation and nozzle parts are uipped with pivoted cover doors, and choring chains are provided. Three nged skirts at the base of the shield e way to uneven ground conditions. The fire shield, measuring 79½ x 75¾ , is packed knocked-down; the wheel riage is bolted to the shield body, and ar supports fold against the shield for ipment and when being wheeled into tion. — *American-LaFrance-Foamite rp., Elmira, N. Y.*

• • •

Radial Saw Improvements

Important structural improvements in Uni-Point radial saws have been nounced by the manufacturer. A hardd steel telescoping ram is now proded, which runs in 32 precision-ground rdened steel roller bearings, which in n run on hardened steel ways. Another provement is a dust cover, which teleopes with the ram, closing it and eping out sawdust and dirt. — *American Saw Mill Machinery Co., Hackettstn, N. J.*

• • •

High-Speed Movie Camera

Three thousand pictures per second taken by a new ultra-high-speed moon picture camera, it is claimed. This mera, with all accessories and a trained erator to help with particular engiring problems, are now available as commercial service to industry. With camera, in which the film flow is ost 60 miles an hour, motion too fast to be observed may be photographed, and later studied. On the screen, high-speed motion is retarded 250 times slower than normal; the film may be stopped or reversed, and small prints may be made from individual frames.—*McLarty Business Films, 986 Ellicott St., Buffalo 8, N. Y.*

• • •

Declivity Level

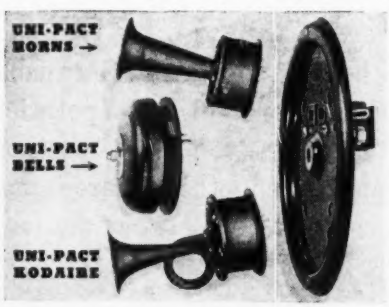
Said to be especially useful to shipfitters and shipbuilders, the new Stanley "Red Glass" level adjusts readily to required angles of declivity or pitch. When the red fluid glasses on the level are set at the desired angle, the mechanic no longer has to use declivity boards. Red glasses can be set individually to any pitch or declivity up to and including 2 inches to the foot. Black dots and arrows on both sides of the level indicate the end or edge to use for declivity readings. Glasses may also be set in pairs to any degree in the circle.

The level is of cherry stock, which is air-seasoned, kiln-dried, and sealed against moisture. Model 23-S is 24 in. long, weighs 2 lb., and is priced at $4.50. Case parts are replaceable for repair, and may be ordered as a complete unit, or separately.—*Stanley Tools, New Britain, Conn.*

• • •

Interchangeable Signals

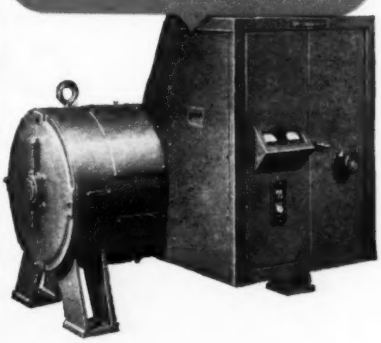
Because of an adapter plate identical for all types of Uni-Pact signals, heavy-duty bells, vibrating horns, and an all-electric air-blast horn, called "Kodaire," may be interchanged at a moment's notice, according to the manufacturer's



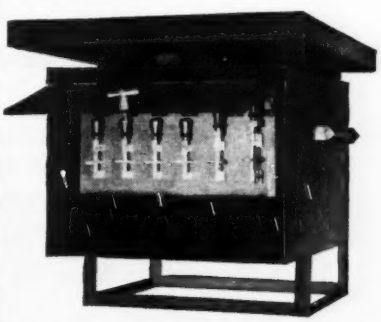
announcement. In industrial plants where operations create varying noise levels, these plug-in signals may be quickly changed to penetrate new noise conditions by turning a maximum of two screws, pulling one signal from the adapter plate, and inserting another type. No change of electrical connections requiring skilled help is necessary.

This signal system comes complete with a dead-front adapter plate, which fits any 4-inch square or octagonal outlet box.—*Schwarze Electric Co., Adrian, Mich.*

ONE MULTIPLE-OPERATOR SET DOES THE WORK OF 20 TO 30 SINGLE-OPERATOR SETS

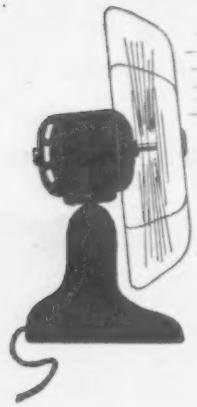


For continuous-duty, mass production welding where a large number of operators can work in a small area, specify Westinghouse Constant-Potential Multiple-Operator Sets. Welding control panels can be assembled in banks or used singly. Operating power factor, where synchronous motor drives are used, will average 80% leading. Over-all efficiency is 45%.



Operator control panels are available in single and two-operator types. Current range is 150, 200, 250 and 300 amperes. Same range for each operator on two-operator types. Dripproof enclosures. For latest literature, write to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N. J-90477

Westinghouse
WELDERS
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE



COOL CABLES CARRY MORE *Current*

Heat — too much heat — is not good for cable insulation. It causes rapid deterioration and eventually will destroy the cable. Just now cables must carry extra heavy loads and are frequently overloaded to a point where they run excessively hot for long periods of time. If ways and means can be provided for heat control and dissipation, future trouble can be averted and interference with service avoided.

Rerouting cables to avoid warm locations will give them a better chance, forced ventilation to carry heat out of conduits and manholes will reduce the heat hazard, wetting soil around underground cables will aid dissipation of excess heat, opening up close groups of cables will provide better ventilation and cooler operation, external heat can be avoided by relocation of either the cable or the source of heat.

Any reduction of heat in or around a cable will increase current carrying capacity and give more efficient operation. It means more satisfactory service from the cables you have, postponement of replacements and conservation of copper and other scarce materials of which cables are made.

Simplex Wire & Cable Co., 79 Sidney Street, Cambridge 39, Mass.

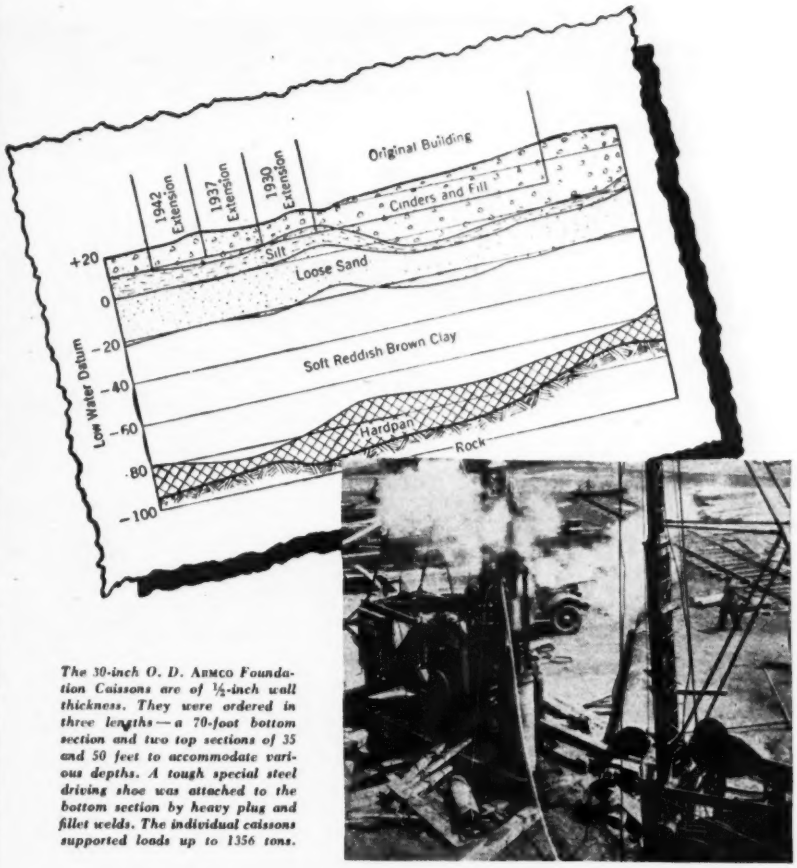
Simplex WIRES and CABLES

ANUFACTURERS' ACTIVITIES

UNCEMENT is made by the Dica- that A. L. has been d president, ding C. A. enhoff who chairman board. The Co. was or- in 1929, ac- an extensive of diatoma- arth near , Calif., where the first plant peration in 1930. Since 1936, a lant has been producing Dicalite from a large diatomaceous de- r Terrebonne, Ore. The Dicalite tion is said to be the largest exclusively to the research, de- t and production of diatomace- ucts. These are chiefly filteraids, igh temperature insulation, ad- and absorbents. Division offices ted in New York, Chicago and eles, with district offices in other cities.

T G. GLASS has been appointed ident and manager of operations Geneva Steel Co., recently or- for the operation of the new Plant Corp. steel mill at Geneva. e also will serve as a director. s, who has been assistant man- operations of the Chicago dis- Carnegie-Illinois Steel Corp., red the service of its subsidiary, is Steel Co., in 1912, when he member of the inspection de- He was advanced to assistant of the inspection department became assistant to the man- perations in the Chicago district, 941, was promoted to the posi- has held until this time. Mr. graduate civil engineer of the e University.

WELD EQUIPMENT CORP. of Long y, N. Y., has pioneered in the nt of equipment for cutting cast iron under water and until as maintained a contract service water work. Such services have extensively in marine founda- channel clearing as well as o facilitate under water cutting work by divers, Craftsweld a two-way communication sys- eliminated headphones and the ing mouthpiece in the diver's



The 30-inch O. D. ARMCO Foundation Caissons are of ½-inch wall thickness. They were ordered in three lengths — a 70-foot bottom section and two top sections of 35 and 50 feet to accommodate various depths. A tough special steel driving shoe was attached to the bottom section by heavy plug and fillet welds. The individual caissons supported loads up to 1356 tons.

Loaded up to 1356 TONS
—BUT THESE CAISSONS TOOK IT!

It was no easy matter to provide foundation support for this extension to a public service plant. The site was on the banks of a river and individual caissons had to support loads up to 1356 tons. To guard against misalignment as well as any further settlement of the original station, engineers carried the heavy building loads 100 feet below the surface. ARMCO Foundation Caissons were "drilled-in" and socketed into solid rock.

You too can safely use ARMCO Drive Shells, Pipe Piling and Caissons on your most difficult foundations. "Spiral Welded" is known for its strength, straight driving and water-tightness. Order it in any specified length (not random) that can be handled and shipped. Diameters range to 36 inches and wall thicknesses from 3/16 to ½-inch.

It will be well worth your time to look into the many time-and-money saving features of ARMCO Foundation Pipe. Ask for complete information as well as quotations and shipping promises. The American Rolling Mill Co., Pipe Sales Div., 1431 Curtis Street, Middletown, O.

ARMCO

ARMCO

Spiral Welded Foundation Pipe

THE STORY BEHIND "LITTLE BIG INCH" IN NORTH AFRICA

Why SYDNEY S. SMITH Chose NAYLOR LIGHT-WEIGHT PIPE FOR HIS PORTABLE PIPE LINE UNIT

Sydney S. Smith helps bring into position a section of Naylor Pipe for his portable pipe line. This 4-inch Naylor Pipe in uniform 20-foot lengths weighs only 90 pounds and is easily handled by one man. The flexibility of Naylor Pipe permits it to be laid over rough terrain and also affords greater protection than a rigid pipe line against bombing.

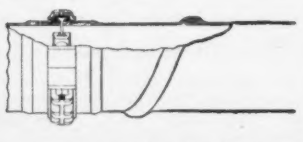
Everyone knows about "Big Inch", but few people know the story behind "Little Big Inch"—the nickname given Naylor Pipe for its outstanding performance in supplying gasoline, oil and water to the Allied Armies in North Africa.

It all goes back to 1928 when the Naylor Pipe Company pioneered the combination of light-weight pipe with standard weight ends. The petroleum industry was the first to recognize this natural combination. Through Naylor's exclusive Lockseam Spiralweld structure, the resulting pipe was stronger and more flexible, yet light in weight, and the standard weight ends permitted the use of established means of pipe connections.

When war came in 1939, Sydney S. Smith, manager of the products pipe line department of the Shell Oil Company, foresaw the difficulties of transporting petroleum products in an all-out war and conceived the idea of a portable supply line.

It was only natural that he chose Naylor Pipe for this important job. Combined with Victaulic couplings and an ingenious system of controls, this portable pipe line unit is credited by the Army as providing a major contribution to the success of the North African campaign.

This is just another example of the application of American peace-time products to the winning of the war.



Cross-section of Naylor Pipe showing standard weight grooved ends attached with Victaulic coupling.

Naylor

NAYLOR PIPE COMPANY

1248 East 92nd Street, Chicago, Illinois

helmet or for the tender on the
It substitutes microphones and
loudspeakers that are more co
and comfortable. The company
received the Army-Navy "E" fo
lence in production.

H. HERSHEY MILLER has been
as an engineer representative of the Calcium Chloride Association with assignment especially as counsellor on concreting. For many years he was chief materials engineer for the Pennsylvania Department of Highways and later testing engineer for th
sylvania Turnpike Commission.
past three years he has been
engineer of the Pennsylvania S
Gravel Producers' Association. In
War I he served with the 103r
neers and 109th infantry and
captain on the staff of General P
He is author of a number of art
concrete problems and has served
mittees of the Highway Research
American Society for Testing M
and Pennsylvania Society of Prof
Engineers, and at present he is p
of the Engineers Society of Penns

ALBERT G. DEGRAFF has been
resident manager of The Aust
engineers and builders, in Phila
it is announced by J. K. Gann
president and eastern district
of the company. Mr. DeGraff is
uate of Ferris Institute and the
sity of Michigan. He joined the
Co. in 1930. Prior to joining t
pany he served with the U. S.
Corps in World War I and also
broad experience in practical
shop work, structural fabricating,
man on construction jobs and i
tural design engineering. Mr.
succeeds J. C. Childs, who retired
after 26 years of service with the
Co.

RAYMOND A. JONES, vice presi
the J. A. Jones Construction C
Panama City, Fla., has taken ove
tion of Wainwright Ship Yard,
tion to his other duties, to relie
Appen, general manager, who h
elected a vice president and pl
charge of all construction. Mr.
who has been general manager
Wainwright Yard since the st
gone to the home office at Charlot
Negotiations are either under
about to begin for construction
home and in South America at
mated cost of nearly half a billion
Mr. Appen will be in charge of t

PARSONS

g, wide crawlers, three point sus-sion, overload clutch, two speeds buckets and conveyor along with digging speeds are a few of Par-s' Trenchers outstanding features.

TRENCHERS Speedily Build Home Defense

Finishing ahead of schedule means only one thing—SPEED. That's how the Parsons' Trenchers have built and will continue to build a home defense that will not be penetrated by the enemy. With sixteen digging speeds ranging from eleven to thirty-nine inches per minute how could they help but be a home defense weapon. Add to this sixteen forward speed changes and four different reverse accelerations. The traveling speed of these rugged metal soldiers is one and three-fourths miles per hour. An added speed feature is the two speeds on the bucket line. For SPEED as well as clean and deep digging, Parsons has been the accepted standard for over thirty-five years.

THE PARSONS COMPANY • NEWTON, IOWA

RENCHING EQUIPMENT

PARSONS

Photo by Office of War Information

Building the far-flung bases for land, sea, and air fighters, mammoth production plants, sprawling shipyards . . . all the vast construction projects for war, and completing them in time, is one of the toughest jobs ever tackled. America's "soldiers of construction" have met the challenge, at a pace that smashes all previous records.

It's a job that is tough on tools. Stanley Tools are being used, and used up, in quantities never before imagined.

Only after war construction needs have been met, can tools be made available for normal purposes. Meanwhile, give your present tools extra care . . . order new ones only for essential use. Stanley Tools, Division of The Stanley Works, 182 Elm St., New Britain, Conn.

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STRUCTURAL STEEL
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To { Street ..... / City..... State..... / Company..... Position..... / Nature of Business.....

Daniel W. Bateman, who has bee ministrative assistant to Mr. Appe be executive assistant to Mr. Jone will direct housing, personnel, tra labor and public relations, time-ke payroll and auditing, the legal de ment, safety and first aid.

William H. Tait, who has been nical assistant will continue the sa

Charles C. Clark, chief engineer also be an executive assistant in c of engineering and drafting. Purch and expediting departments have transferred to his direction and he have charge of storing materials.

J. L. Layton, assistant works ma in charge of machinery and equip will continue the direction of this d ment of the yard and Aster F. P assistant works manager in char hulls, will continue the direction o construction.

THE LINCOLN ELECTRIC CO., Cle Ohio, manufacturers of arc welding equipment, has announced the appointment of William J. Conley, former chairman of the engineering department of the University of Rochester, as consulting engineer. He will act as welding consultant for various ind handling problems on mechanica structural design utilizing weldi well as metallurgical problems in welding processes. He will also charge of the company's welding tional activities.

LOCATED on Chicago's west side North Aberdeen St., the Sellstrom Mfg. Co. occupies a large portion of a six-story building where it manufactures and distributes nationally a complete line of safety equipment such as goggles, helmets, shields, lenses, respirators and other simila ucts. G. E. Sellstrom, president, w of the founders of the business, recently celebrated its 20th anniv

ANNOUNCEMENT is made by the Tractor & Equipment Co. of Sal City, Utah, that it is discontinu handling of Caterpillar products sociated lines. The Landes Co. h in the industrial and construction ment business in Salt Lake City years. It is retiring only from the business and will continue to h

U. S. army Signal Corps Photo

he Truck that Beat the Boats to Sicily

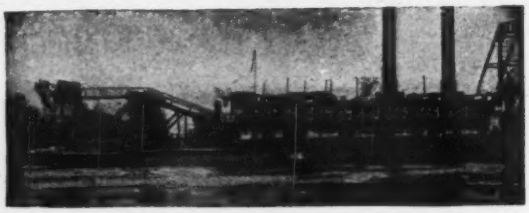
ical example of B. F. Goodrich leadership in truck tires

ED for the shores of the Sicil- coast that gray July morning nge group of craft. Leading ion fleet, they hit the beach ept right on going! For these army's new amphibious trucks ne on land or sea.

tened "Ducks" by soldiers, w vehicles are actually 2½-ton propeller-driven in the water, -wheel drives which carry them peeds on land. They are partic- ell suited to landing men and on ordinarily inaccessible spots. ese strange vehicles tires were m. Tires had to be light in provide traction in sand, resist and cutting, and withstand usual rigors of army service. Ordinary truck tires wouldn't do. Regular military tires failed on the job. Then they thought of a special tire built originally by B. F. Goodrich for desert use. Broad of tread, flexible and light in weight, it provided traction in the deepest desert sand. Because of its flexibility and shallow tread, it withstood the impact of sharp rocks and beach boulders. Here was the ideal tire for the "Duck". With no modifications at all this desert tire went to sea, has proved itself from Sicily to the South Pacific.

Here is another example of the truck tire developments which have made Silvertown Truck Tires first choice for tough jobs. Even the regular Silvertowns are designed for extreme service—have wear to spare for everyday operations. You're miles ahead with B. F. Goodrich Silvertowns on your trucks.

DREDGING



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Deep Waterways and Ship Channels

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1,750,000 gallon water tower, New Britain, Conn.

184 ft. Preload dome, covering 1,500,000 gal. water reservoir.

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We maintain a staff of engineers who will be glad to handle your problems. We design and construct complete installations for water, oil, gasoline, chemicals, other liquids and for dry storage. Send coupon today for data.

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I am interested in the Preload System for the construction of.....
Kindly send me data. Have one of your engineers call and discuss our work.
Name .....Address .....

few high grade lines of industrial construction machinery. Its new loc will be at 171 West South Temple, Lake City, Utah.

The purpose of this change, H Landes, president, says, is to have firm ready to take on several very portant activities and new develop in the machinery field.

ANNOUNCEMENT is made by M Steinhardt, president of the American Steel Wool Mfg. Co., Inc., Long Island City, N. Y., of the appointment of Harry E. Bell as general sales manager. Mr. Bell has directed the sales of the company's products for household use and now takes on the addi duties of directing sales of the entir to include industrial packages and cial steel wool items for the trade.

THE FIBRE CONDUIT CO., 292 Ma Ave., New York, and Orangeburg, has announced the election of Joh Fisher as a director. Mr. Fisher is tary and treasurer of Standard Br Inc. The Fibre Conduit Co. ma tures underground conduit, fibre pip electrical underfloor duct systems.

LOIELL HYLER, until recently engineer of R. G. LeTourneau, Inc., Peoria, Ill., has been made assistant chief engineer of LaPlant - Choate Manufacturing Co., Inc., Cedar Rapids, Ia. Mr. Hyler has been LeTourneau's head assistant in product engineering and design for the past seven half years. He will be in full of scrapers for LaPlant-Choate.

JAMES (JIM) POOLE has recently appointed to the sales staff of the stone Asphalt Products Co., Chica Mr. Poole will assist T. R. Johnson manager in national sales work an make his headquarters in the com Chicago office.

A NEW SOUND motion picture film "Right on the Nose," which sho detail the quickest, easiest meth adjusting non-prescription in safety goggles is announced by the ican Optical Co. of Southbridge. The 16 mm. film runs 14 min. and are available for loan or purchase

GIVE IT THE OTHER BARREL
... THAT'S ALL THERE IS TO IT!

You replace a damaged Mathews Hydrant as easily as giving a duck the other barrel. Merely unscrew the broken hydrant barrel from its elbow—it contains all operating parts—lift it out through the loose protection case, then slip in a new barrel, or a reconditioned one.

Simplified maintenance is but one of the many advantages which Mathews Hydrants offer your community in efficient, frost-proof fire hydrant protection. Write for the full story.

MATHEWS HYDRANTS

00 CHESTNUT STREET, PHILADELPHIA, PA.

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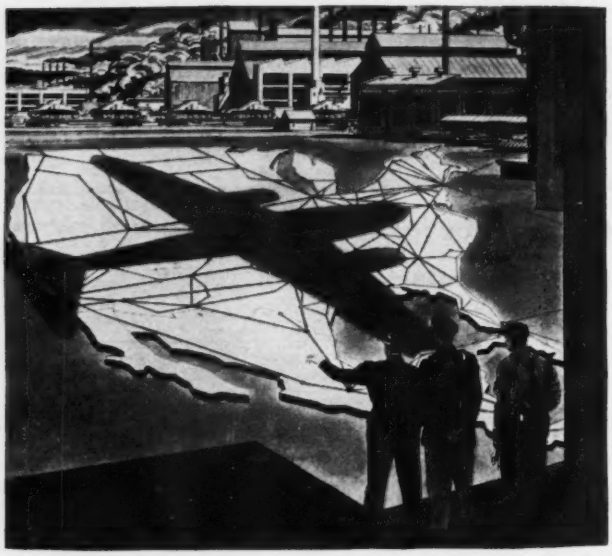
Made by R.D. WOOD Company

MANUFACTURERS OF SAND SPUN PIPE (CENTRIFUGALLY CAST IN SAND MOLDS) AND R. D. WOOD GATE VALVES

Get it Fast...specify AIR EXPRESS



IF you want your orders shipped *fastest way*, be sure to specify "ship AIR EXPRESS"—because general instructions such as "urgent" and "rush" may be misinterpreted by the shipper.

And it's especially important to specify AIR EXPRESS if your shipment is vital to a war job, because it saves something like 75% of the hours and days consumed over the next fastest means of shipping. This 3-mile-a-minute service is available direct to more than 350 U.S. cities and to scores of foreign countries.

AIR EXPRESS RATES REDUCED

As a result of the great volume of Air Express traffic created by wartime demands and the increased efficiency developed to satisfy these demands ...Air Express rates within the United States have been substantially reduced, in some instances as much as 12½%, depending on the weight of the shipment and the distance it moves. Consequently, shippers nationwide are now saving an average of 10½% on air cargo costs.

NOTE TO SHIPPERS: *Ship Early*—as soon as shipment is ready—to assure fastest delivery. *Pack Compactly*—to conserve valuable space.

ASK for our new 1943-44 CALENDAR-BLOTTER. Write Dept. PR-11, Railway Express Agency, 230 Park Avenue, New York 17, N. Y.

AIR EXPRESS
Gets there FIRST

Phone RAILWAY EXPRESS AGENCY, AIR EXPRESS DIVISION
Representing the AIRLINES of the United States

duced by the Jam Handy picture or
ization, the film represents an answe
industrial eye accidents caused by w
ers who discard improperly fitted gog
because they are uncomfortable to w

DR. GORDON N. SCOTT, expert cons
ant in corrosion mitigation, has jo
the executive staff of Industrial Engineering Co. as consulting engineer in charge of research and development. The company is the manufacturer and supplier of Somastic pipe coating. Central plants are at Houston, Tex., and Wilmington, Calif., with offices al
Bartlesville, Okla., Los Angeles and
Francisco. Dr. Scott has had exte
experience in corrosion investigation.
was educated at the University of
fornia, in 1926 taking a Ph.D.
chemistry.

CONSTRUCTION is under way at G
ville, Miss., for a plant to manufa
concrete blocks for reveting banks o
Mississippi River in the Vicksburg
neer District. Julius Sorenson and
of Racine, Wis., who have a contra
manufacture 2,000,000 blocks, are
erecting a plant in South Greenvill

HARRY G. PORCH, manager of
since 1900 in the Boston, Mass., office of Lukens Steel Co., retired from active duty on Sept. 1 after 48 years of continuous service. In 1895, he started as assistant to the manager of the company's Philadelphia sales office. In 1900 he was made manager of sales in the
England office in Boston, a positio
held until his retirement.

ROBERT H. MCCRACKEN has bee
pointed manager of combined sales of the Boston Office of Lukens Steel Co. and subsidiaries, By-Products Steel Corp. and Lukenweld, Inc. Mr. McCracken was born and educated in Philadelphia, Pa., was formerly associated with Central Iron & Steel
where he served for 18 years as
delphia district sales manager. Fo

What makes a mosquito buzz?

led motors roar suddenly as the oat starts her sprint. Almost before s arch from the enemy cruiser, Yankee Mosquito knifes in, lays ng, lethal egg and bounces away ide open 70 knots. Scratch an- Nip cruiser.

h hit and run fighting demands s that don't miss. They must hum sly to take a 77-foot cockleshell enemy guns. And PT motors *don't* miss—RPM DELO helps guarantee that.

Developed to solve the special problems of Diesel lubrication, RPM DELO ends the danger of stuck rings. It actually cleans motors gummed by other oils. RPM DELO's special additives guard bearings against corrosion, minimize sludge, cut wear to a fraction.

If you're interested in slicing repairs as much as 50%, in doubling the time between Diesel overhauls, remember the lubricant that helps make the Navy's Mosquito boats buzz.

ORDER RPM DELO FOR YOUR DIESELS

RPM DELO is marketed under these names:

RPM DELO
Caltex RPM DELO
Kyso RPM DELO
Signal RPM DELO
Sohio RPM DELO
Imperial-RPM DELO
CONCENTRATE

Ask your Diesel engine manufacturer or distributor for the RPM DELO supplier in your vicinity

STANDARD OIL COMPANY OF CALIFORNIA

As a built-in power unit on portable or mobile equipment, you'll have to look a long time before you can out-point this Model VE-4, V-type, 4-cylinder, Wisconsin Air-Cooled Engine.

This husky heavy-duty "lightweight" checks in at 285 lbs. and delivers 22 hp. at 2600 rpm. Other Wisconsin Air-Cooled engines (from 1 to 31 hp.) are equally adaptable to a great variety of applications where lightweight is wanted, without sacrificing heavy-duty serviceability.

WISCONSIN MOTOR
Corporation
MILWAUKEE 14, WISCONSIN, U. S. A.
World's Largest Builders of Heavy-Duty Air-Cooled Engines

"Oomph"
DRAFTING

RE-SURFACE
Worn Boards.
Modernize New Boards.

PRECISION-IZE
Pencil Drawings
For Perfect Prints!

RELIEVE
Shortages of Men and Materials

SPEED
Production, Yet Cut Costs!

NO-INK Drawing Board TOP

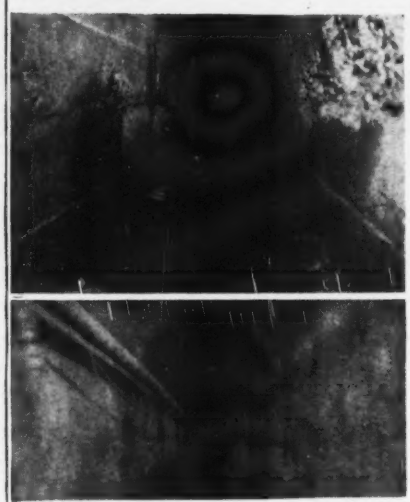
Adopted as Standard By Major Industries

Resilient drawing surface produces a sharp, opaque stroke in the drawing—results in perfect prints—makes inking unnecessary. The most perfect, most delightful surface to work on.

Users are reordering in quantity. Over 25,000 NO-INK Drawing Board Tops already in use, saving man-hours, speeding production, renewing discarded boards, and modernizing new boards. Tops come cut to exact size of any board. Attached in 10 minutes,—ready for immediate use. Economize, modernize drafting procedure. Write for catalog, prices and trial offer.

W. H. Long Co., 425 N. Clark St., Chicago 10, *Est. 1911*

TUNNEL



This air-conditioning exhaust water tunnel was once a concrete sewer. The badly disintegrated walls (upper photo) were reconditioned with "GUNITE," ten years ago, and are still intact. Write us for specifications used on this job.

The "CEMENT GUN" can be bought by anyone, and used without restrictions.

CEMENT GUN COMPANY
Manufacturers of the "CEMENT GUN"
ALLENTOWN, PENNSYLVANIA

WE ARE ALSO "GUNITE" CONTRACTORS
LET US BID ON YOUR WORK

past two years he has been assi general sales manager of the home in Harrisburg. H. G. Austin, who been assistant manager of sales in Boston Office has been appointed a ant manager of combined sales.

W. C. DAVIS has been appointed sistant director of sales in charge of the export and contractors' sections of Atlas Powder Co.'s explosives department. Mr. Davis, who completed 25 years with Atlas last year, has been manager of the contractors' section since 1937. Born in Greenwood, Va began with Atlas as a salesman in becoming sales agent in charge of Atlas Upper Anthracite Office in He was appointed manager of the delphia district office in 1928, and to Knoxville, Tenn., as manager of Atlas district office in 1931. As a re of this wide and varied experience, Davis has an extensive knowledge explosives sales and service.

THE APPOINTMENT of E. A. Phoenix assistant manager of the Transite bestos Pipe department of Johns-M ville has been announced. Mr. Phoenix began his business career with Kieselguhr Co. of America in 1915. This firm later became the Celite Products Co. which became part of Johns - Manville Corp. in 1928. After serving in various sales and adverti positions, Mr. Phoenix was made sistant sales promotion manager in A 1936. In May, 1942, because of knowledge of the company's widely di sified product lines, he was transfe to the priorities department, a posi which he held until his recent promo Mr. Phoenix will serve as general sistant to C. A. McGinnis, manage the transite pipe department, and specialize in field sales and educati phases of the business.

INDUSTRIAL BROWNHOIST CORP., City, Mich., has announced a chang address for its Cleveland sales o It is now at 1812 Terminal Tower, C land 13, Ohio. This corporation is on the large manufacturers of locomo cranes. In addition to the home offic Bay City, sales offices are maintained New York, Philadelphia, Pittsbu Cleveland and Chicago.

Lock Joint Pipelines Speed Work on Synthetic Rubber Plants

NTHETIC RUBBER is vital to the war effort and water supply is vital to the production ynthetic rubber.

Reinforced Concrete Pressure Pipe is sup- ying the immediate need for pipelines, and being "tailor-made" to fit the job, is con- ving thousands of tons of steel urgently eded for the production of armaments.

Probably in no other type of work are there so many special fittings, elbows, tees or wyes required as in the pipelines serving synthetic rubber plants—yet each one of these can be quickly and readily supplied in standard Lock Joint designs.

◆ ◆ ◆ ◆

Whether your project is large or small, your 'phone call, telegram, cable or letter to any of our offices will bring a prompt reply.

LOCK JOINT PIPE COMPANY

Established 1905

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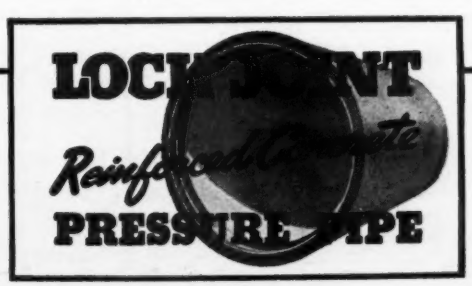
Denver, Colo. • Chicago, Ill. • Kenilworth, N. J. • Kansas City, Mo. • Rock Island, Ill. White Plains, N. Y. • Valley Park, Mo. • Cleveland, Ohio • Hartford, Conn. • Navarre, Ohio

SCOPE OF SERVICES *Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply Mains as well as Concrete Pipe of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous lines.*



SIMPLIFIED DESIGN OF REINFORCED CONCRETE

by

Harry Parker

Professor of Architectural Construction, University of Pennsylvania

for
ARCHITECTS ENGINEERS DRAFTSMEN BUILDING-CONTRACTORS

This simplified book is the ideal solution for a "refresher" in Concrete. It covers the most common structural elements in plain and reinforced concrete design, and includes enough theory to give the reader a thorough knowledge of essential principles.

Sample chapter headings such as Shear and Bond Stresses, Formulas for Bending, Design of Beams, and Proportioning and Mixing, are indicative of the material covered. Practice problems, safeload tables, derivation of basic formulas and ample illustrative examples are included so as to make no advanced training or advanced mathematics necessary to understand the discussion.

The book wastes no time on non-essentials: It is written briefly, simply and clearly. Flexible covers and pocket size make it excellent for field use as well as office work.

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Air Recovery Equipment—A new bulletin, complete with charts, tables, illustrations, and specific examples, points out how great savings may be effected in fuel through air recovery equipment, permitting the use, over and over again, of air that has been properly conditioned as to moisture and warmth. In the summer, considerable savings are obtained when air is cooled and otherwise conditioned. The data and information pages are securely bound in a standard file folder so that the bulletin may be filed for ready reference.—*W. B. Connor Engineering Corp. of New York, N. Y.*

Lubrication Guide—A valuable 64-page booklet is "Lubrication and Maintenance Guide for Contractors' Equipment." It covers the following: engine lubrication, care of air cleaners, superchargers, oil filters, cooling systems, carburetors, ignition, valves, transmission assemblies, open gears, wire rope, hydraulic systems, bearings, compressors, and pumps. It also gives cold weather operating hints and contains many other valuable features.—*Gulf Oil Corp., Gulf Building, Pittsburgh, Pa.*

Reinforced Concrete—No. 7 of the series of brochures on "Modern Developments in Reinforced Concrete" gives full technical descriptions—illustrated with photographs, diagrams and mathematical tables—of a loading test on a girderless concrete floor with 50-ft. panels, and aircraft hangars of reinforced concrete.—*Structural Bureau, Portland Cement Association, 33 West Grand Ave., Chicago, 10, Ill.*

Felt Facts—A booklet just issued by The Felt Association, Inc., tells the story of the manufacture and many uses of wool felt. It is written in non-technical style and is timely because of the hundreds of new uses, civilian and military, which have been found for this fabric since the war began. Attention is called to its applications in engineering and mechanical fields as an alternate for rubber, cork, certain fabrics and plastics, and other priority materials. The importance of wool felt in improved technique vibration-isolation, filtering, grinding and polishing and other processes is revealed. The modern manufacture of this oldest of fabricated fibre material is portrayed in

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Why?

WHAT DOES IT ADD TO APPEAL?

THE gripping unit in an Electroline-Fiege Wire Rope Connector holds like a Bulldog because it has a "Positive Grip". The holding compression is graduated from front to rear so that danger of crystallization, due to vibrations, is eliminated. Frayed strands and early failures are avoided.

Many other advantages, such as greatly increased wire rope life, elimination of hazards to workmen, etc., have made these connectors first choice for dependable results. Let us send you an interesting booklet, "Positive Grip". It will give you complete performance data on this easily installed, better and more economical streamlined connector. Write today.

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HYDRO-TITE

The dependable self-caulking joint compound for jointing cast iron water mains — uniform — easy to prepare — easy to use — in service for more than 30 years.

HYDRAULIC DEVELOPMENT CORPORATION
50 Church St., New York, N. Y.

FIBREX — A sanitary packing used like braided jute — will not breed bacteria — 30% lighter than jute — put up in 60 pound reels.

DRY BRAIDED
Fibrex

THE BIG THREE
of Rollway's Right-Angle Bearing Loading

1. GREATER BEARING CAPACITY

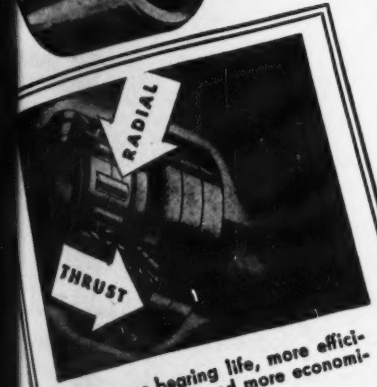
2. LOWER STARTING TORQUE

3. REDUCED MAINTENANCE TIME

Whether it's heavy radial loads or thrust loads . . . constant loads or shock loads . . . that are bothering you, change-over to Rollway Precision-Type Cylindrical Roller Bearings offers a quick, easy way to achieve: 1—more bearing capacity; 2—lower starting torque; 3—improved service from a maintenance standpoint. ALL within the dimensional limits of your present sleeve-type bearings.

Right-Angle Loading Simplifies the Stresses

Simplification—that's the answer back of the increased capacity and life of Rollway's Cylindrical Roller Bearings. For Rollway splits every load into its two simple components of *pure radial* and *pure thrust—carrying each of these on separate bearing assemblies at right angles to the roller axis.* That eliminates compound loads, oblique loads, and the resultants of compound forces. The total magnitude of stress carried per roller and per bearing is substantially less. Rollers and races stand up longer. Lubrication is simplified. And the cylindrical rollers eliminate all tendency to pinch out between the races, greatly reducing end-rub and wear-back of the roller head.



For longer bearing life, more efficient performance and more economical maintenance . . .

FOLLOW THIS BASIC BEARING PRINCIPLE

- All radial loads carried at right angles to the roller axis.
- All thrust loads carried at right angles to the roller axis.

Standard Sizes for Most Applications

S.A.E. or American Standard metric dimensions and tolerances in a wide range of sizes and types assure low cost and ready availability for most applications. Let Rollway engineers recommend the types best suited for your needs. Just send drawing or detailed description. No cost or obligation for this helpful service.

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BEARINGS

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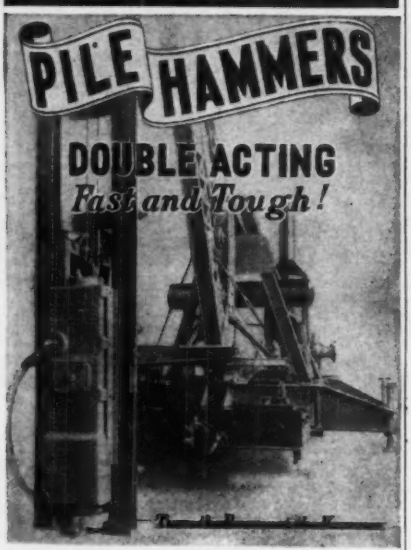


EST. 1900
Union Iron Works, Inc.
ELIZABETH, New Jersey

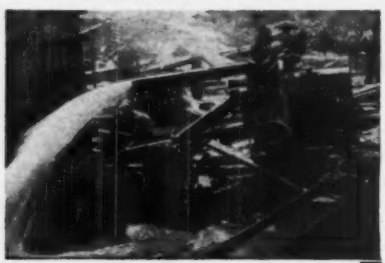
sixteen drawings by a noted artist.—*The Felt Association Inc. of New York, 366 Madison Ave., New York, N. Y.*

Engineered Prefabrication—A 16-page brochure entitled "Engineered Prefabrication" is being issued. It is a comprehensive work covering the facilities to enable any plant to prefabricate wood structures ranging from chicken coops to large industrial buildings and boats. It is illustrated with more than 60 photographs. The book is offered free to those interested in this important development in the building industry. Requests will be filled as soon as the book is off the press, but the manufacturers say the edition will be limited so that reservation should be made.—*The City Lumber Co., 75 Third St., Bridgeport 1, Conn.*

Synthetic Resin Glue—New uses for synthetic resin glue as a vital war material are described in a booklet published especially for builders, contractors, architects and engineers. This 20-page illustrated publication shows how waterproof glues are used in the construction of ships, defense homes and buildings, arches and beams, and such smaller items as laminated pulley wheels, etc. All types of glues are described—phenol resins, urea resins, melamine resins, casein, casein-soybean and soybean glues. Also included is a section on wood preservatives.—*I. F. Laucks, Inc., Maritime Bldg., Seattle 4, Wash.*

Heat Transfer Problems—Charts to simplify the solution of heat transfer problems in connection with refractories and high-temperature insulation are contained in a new 16-page booklet. Curves on the ten full-page charts are plotted in terms of conductivity factors. The novel arrangement makes it possible to use the charts for firebrick, insulating brick, refractory concrete, plastic refractories, or any refractory material for which the conductivity is known. The industrial furnace designer can use the charts for rapid determination of cold-face temperatures and heat losses. He can select the proper material, or a combination of materials, and wall thickness to give a desired cold-face temperature or to minimize heat-loss. Efficiency of two or more designs of furnace wall or flue lining can be readily compared. The curves are calculated in accordance with A. S. T. M. "Recommended Procedure for Calculating Heat Loss Through Furnace Walls." Designers and operators of industrial furnaces, flues, stacks and process heating equipment will find the booklet a time-saver.—*The Atlas Lumnite Cement Co., 135 E. 42nd St., New York 17, N. Y.*

Rigid Frame Knees—Commencing in 1941, the David Taylor Model Basin,



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CONTINUOUS
Pumping
under all conditions

Contractors standardizing on Gorman-Rupp Pumps are getting extra hours instead of costly shut-downs due to pump failures. There's a *definite reason*. More dependable. No priming jet to clog. No control valve to jam. This is important today when every piece of equipment has to take a beating. Let your distributor show you why more contractors are switching to Gorman-Rupp's every day.

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Self-Priming Centrifugal Pumps

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"A"
TRADE-MARK
STEEL TAPES

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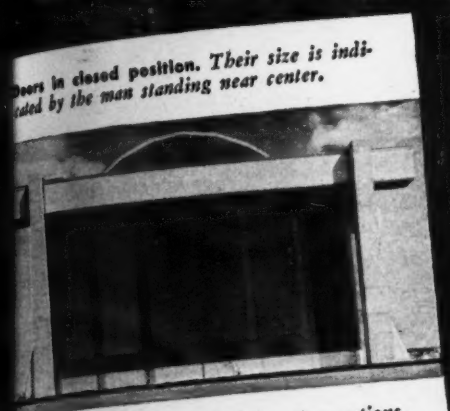
I'LL TAKE THE WHITE ONE EVERY TIME!

GRADUATED IN INCHES OR TENTHS

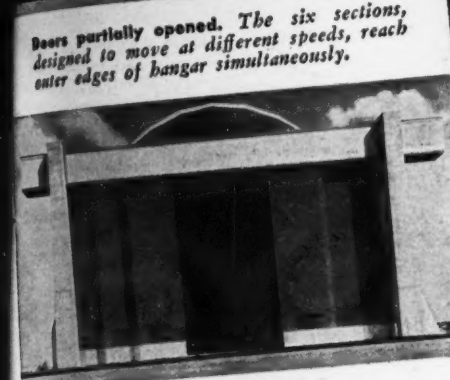
EASY-TO-READ, *raised* black graduations on crack-proof white surface . . . resist abrasion from rock, sand, scraping over rails, pipe, concrete, etc. In all sizes and types—in cases or reels. Ask your dealer—or write for catalog.

EST. 1867
KEUFFEL & ESSER CO
NEW YORK · HOBOKEN, N. J.

240-TON DOORS

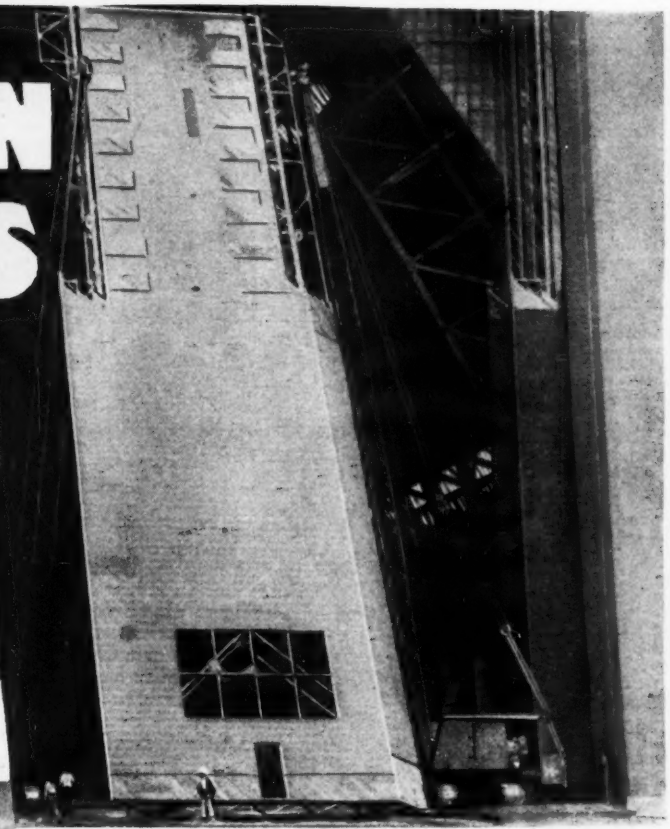


Doors in closed position. *Their size is indicated by the man standing near center.*



Doors partially opened. *The six sections, designed to move at different speeds, reach outer edges of hangar simultaneously.*

Doors completely opened, *showing entire end of hangar unobstructed.*



Each 40-ton section, *measuring 120 x 37 feet, was erected in one complete piece. Construction is steel frame, faced with wood.*

Designed and Built by INGALLS

Among the world's largest doors are these, which with their operating mechanism were designed and built by Ingalls for Lighter-Than-Air Hangars of the U. S. Navy. In spite of their tremendous size—120 ft. high by 220 ft. wide—and their enormous weight of 240 tons, they operate completely automatically, by electric push-button control. Opening or closing time: 2½ minutes.

Structural steel doors for blimp hangars are typical of hundreds of unusual designing and construction jobs which Ingalls regularly performs. Ingalls representatives will be glad to consult with you on any problem involving the use of steel.

THE INGALLS IRON WORKS COMPANY
BIRMINGHAM, ALABAMA

Subsidiary Companies and Divisions
STEEL CONSTRUCTION COMPANY • THE INGALLS SHIPBUILDING CORPORATION • BIRMINGHAM TANK COMPANY
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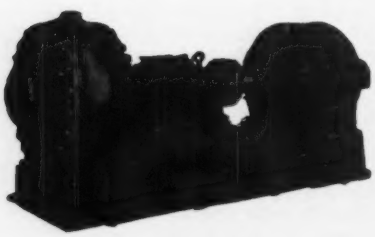
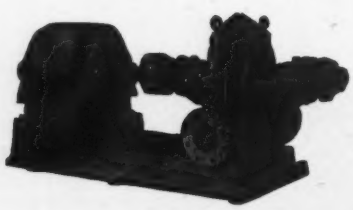
FOR 75 years Morris has specialized in designing pumps to meet difficult requirements. Do your pumping conditions involve abrasive, sticky or pulpy materials . . . high temperatures, pressures, or suction lifts . . . multiple operating conditions . . . corrosive liquids? If so, investigate Morris . . . the largest line of pumps for special purposes. You can rely on Morris experience to supply a design that will operate efficiently and economically. If you have a difficult pumping problem, don't give it up, give it to Morris.



Heavy-Duty Material Handling Pump



Double Suction Horizontally Split Pump for Clear Liquids

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ESTABLISHED 1864

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CENTRIFUGAL PUMPS

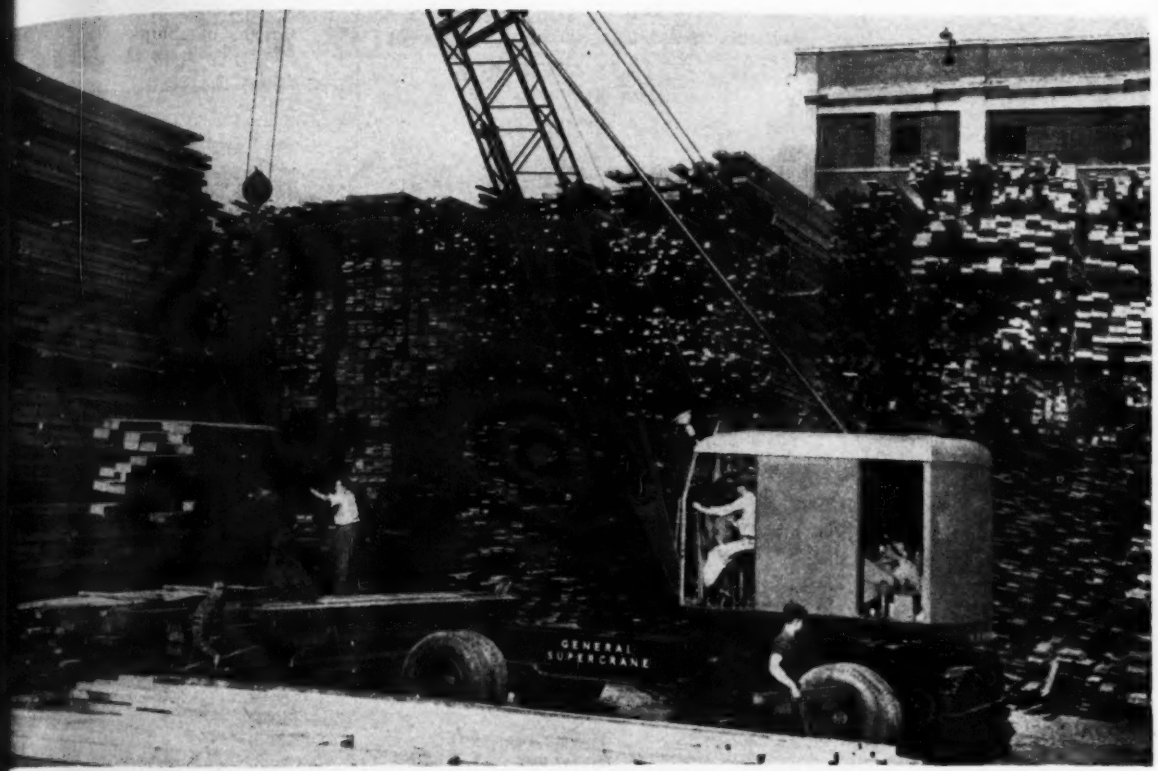
Bureau of Ships, Navy Depart carried out a series of tests on frame knees in which the American tute of Steel Construction cooperat designing and furnishing one o seven specimens considered. The tute also cooperated in this wo furnishing a study by Dr. Bleich ing a simplified theory of design f knees which has been incorporated Taylor Model Basin's report on work. Dr. Bleich's study has now rewritten to serve the practical re ments of the designing engineer "Design of Rigid Frame Knees" presentation of a practical metho design which, it is believed, will be of use to the designing engineer.—*A can Institute of Steel Construction, 101 Park Ave., New York, N. Y.*

Flowmeters—A practical guid accurate metering is an 8-page m on flowmeters, how to install them rectly and keep them accurate. W C. Bennett, the author, has achie practical presentation. With no words he tells how to prevent and meter troubles so that the flow of central stations, institutions an dustrial plants may do a 100 percen for today's war and tomorrow's pea *Cochrane Corp., 17th and Alle Ave., Philadelphia 32, Pa.*

Plywood in Postwar Era—Emp ing the many new developments the war has brought to the plywo dustry, and stressing plywood's p time applications, is the new bookle Service on All Fronts" issued by a producer of plywood. The 16-page let includes more than 30 photograp wartime uses of plywood. These sho only flat plywood products but mo metal-faced, waterproof, and tubular wood products as well. The Army's metal-faced plywood powder box is special attention, as well as the m tubular radio masts made for the S Corps. Several pages are devoted t craft parts made of plywood. An page shows recent developments i boat field.—*United States Plywood 616 West 46th St., New York, N. Y.*

Industrial Pumps — The duotone trations in this catalog of indu pumps are very effective.—*Joshua H Iron Works, Sunnyvale, Calif.*

Conduits — This folder contai general description of the comp products for the insulation and p tion of steam, hot water, oil and p liquid distribution piping. The facturer calls it a "briefalogue" a only a preface to the 1944 general log which will be released later this — *The Ric-wil Co., Cleveland, Ohio.*



GENERAL

recommends the continued purchase of War Bonds and Stamps—and the observance of preventive maintenance to keep your machinery running.

MOVE MORE, FASTER AND FOR LESS COST

The *General Supercrane* is a necessity on any job that requires more work per day . . . more speed on the jobs . . . lower operating costs. How can the *General Supercrane* do all these things for you? It is self-propelled . . . mounted on pneumatic tires . . . operated by one man . . . powered by one engine.

The OSGOOD COMPANY
Sizes: ½ to 2½ Cu. Yd.
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HERCULES
IRONEROLLERS
6 to 12 Tons
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SHOVELS
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GIVING VICTORY A LIFT

ON highways leading to the far-flung battlefields of the world, Cargo Bodies built by the Hercules Steel Products Company are carrying vital materials of war in unbroken lines to our fighting men and their allies.

Hercules Dump Cargo Bodies, too, are giving dependable service in many camps and on many fronts, both at home and abroad.

With so large a proportion of our capacity occupied by war production, it's only natural that our distributors' stocks of Hercules Dump Bodies should be low. However, when you need new equipment for any essential project or a war contract, the Hercules distributor can take care of you, and the same Hercules representative will keep your present Hercules Hydraulic Hoists and Bodies operating at greatest efficiency, if you'll call on him when you need service.

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SPEEDRAULIC HERCULES HOISTS

- Exclusive Center-Lift Action
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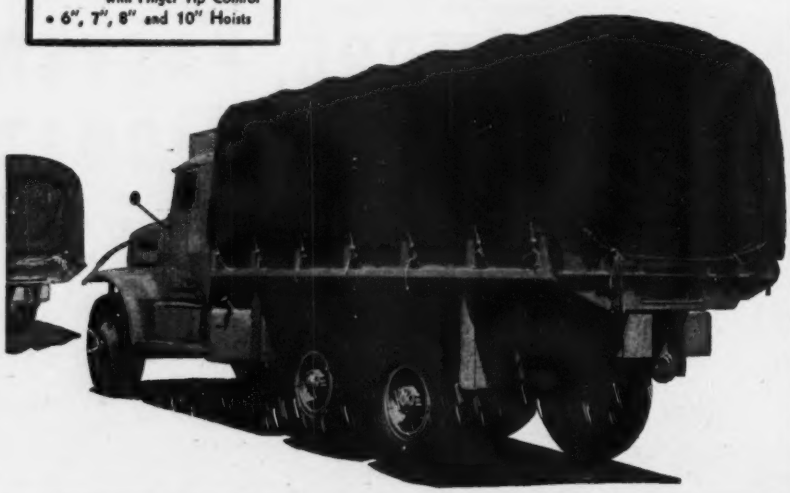

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MEN AND JOBS

Paul Emile L'Heureux has been named Division Engineer, Department of Roads, Province of Quebec, and is located at Beauceville, Que. He is a graduate of the Ecole Polytechnique, Montreal. Class of 1936.

Jacques Price has been named works and buildings engineer of the Royal Canadian Air Force at Halifax, N. S.

Charles H. Buckius, former deputy secretary to chief engineer in the Pennsylvania Department of Highways, has been made chief engineer to take the place of Thomas C. Frame who resigned.

Harry T. Ward of Detroit has been appointed deputy commissioner of the Michigan State Highway Department. He succeeds John G. Schaub, who will continue in the Department on special assignments.

Clarence M. Blair, New Haven, Conn., civil engineer, has been reappointed to the State Board for the Supervision of Dams and Reservoirs.

C W. Smedburg has resigned as city manager at Greensboro, N. C., after serving about 20 years, the last 5½ years as city manager.

H. L Currie has been appointed office engineer of the Canadian National Railroad at Montreal, succeeding J. A. Pearman who retires after 42 years of service in the engineering department of the company.

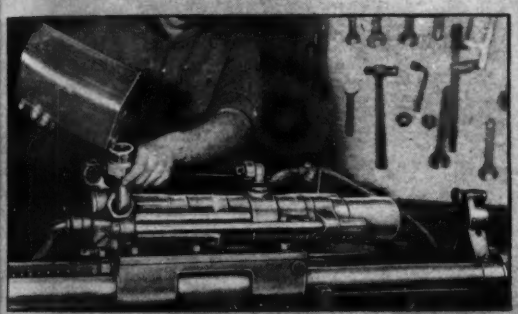
Blake Stevenson, Chattanooga, Tenn., former master mechanic with TVA, who recently completed a project in Puerto Rico, as erecting engineer, is now in charge of all testing equipment at the Wainwright yard of the J. A. Jones Construction Co. who are building Liberties for the Maritime Commission.

Major Arthur G. Odell, Jr., Army Corps of Engineers who has been post engineer and signal officer at the Army Quartermaster Depot at Charlotte, N. C., since July 1941, has been assigned to duty as post engineer at Kennedy General Hospital, Memphis, Tenn. **Captain James M. Gandy,** assistant engineer officer at the Charlotte depot, has been assigned to the Coronaca Air Base at Greenwood, S. C. Major Odell has been succeeded at Charlotte by **Captain W. S. Dee,** who recently has been assigned to duty at Kennedy General Hospital at Memphis, and **Lieutenant Edward A. Mawhinney** has been transferred to

Speed Drilling, Reduce Costs with Regular Lubrication

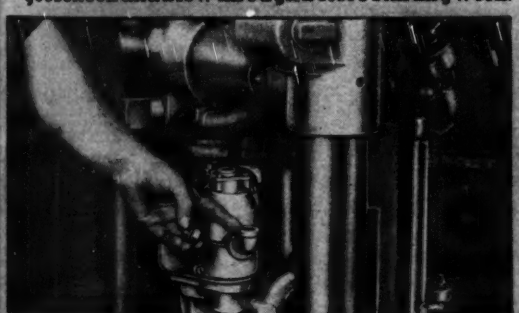
Although rugged and powerful . . . designed for heavy duty, high speed, deep-hole drilling . . . CP G-200 Wagon Drills are easily and quickly operated by one man. They need but little maintenance care — but they do need that little! Keep them tight and lubricate them regularly.

HOW TO GET MAXIMUM SERVICE FROM YOUR CP WAGON DRILL



1 Put about four ounces of fairly heavy oil in the gooseneck and blow through before starting work.

2 Fill rock drill oil reservoir with half a pint of right grade of rock drill oil before every shift.



3 Check gear case frequently, keep filled to plug level. Should have regular attention once a week.

4 Always fill the line oiler twice each day when wagon drill is in operation. Capacity, one pint.

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ROCK DRILLS

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AIR COMPRESSORS
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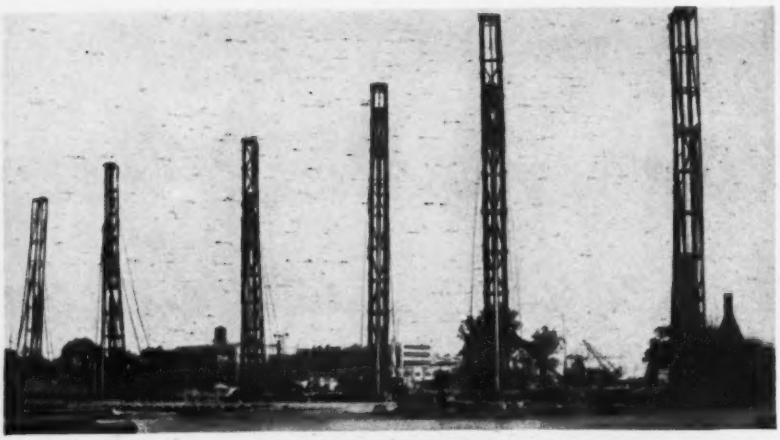

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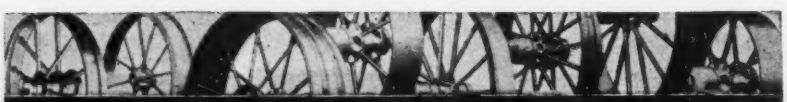
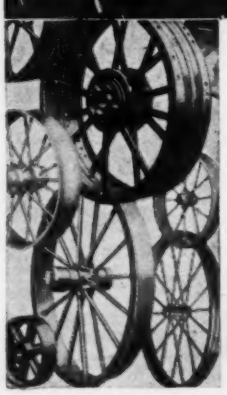


IF YOU USE
WHEELS or AXLES
YOU NEED OUR ENGINEERING EXPERIENCE!



WE have cooperated closely with Industry for more than 50 years —producing millions of dependable, efficient steel wheels and axles; each specifically suited to its task. The knowledge gained through all this experience is available to you *now* —to help you get the utmost service and satisfaction from your "rolling stock". Write today for complete Illustrated Bulletins.

EWC WHEELS

Electric Wheel Co., Dept. NR, Quincy, Ill.

Charlotte from Camp Sutton, N. C., Captain Dee's assistant.

William Hunter Strong of Raleigh, N. C., has been commissioned a lieutenant in the U. S. Naval Reserve and has reported to the U. S. Naval Construction Training Center at Williamsburg, Va. A graduate of North Carolina State College, he was a civil engineer at Portsmouth, Va., prior to entering the service.

Dan Farrell, Jr., resident engineer in the Greater Kansas City area for the Federal Works Agency has been transferred to Omaha, Neb. where he will have charge of the district comprising Nebraska and South Dakota. He is being replaced at Kansas City by **W. V. Thatcher** from Wichita, Kan.

R. J. Wallace, Buchanan county, Iowa, engineer with headquarters at Independence, has been commissioned a lieutenant in the Seabees

The retirement from army life of **Colonel Clay Anderson,** executive assistant of the United States Corps of Engineers for the Sacramento, Calif., area has been announced. **Major Ronald A. Thompson,** with the Corps of Engineers at Sacramento, since 1930, has been appointed to succeed Colonel Anderson.

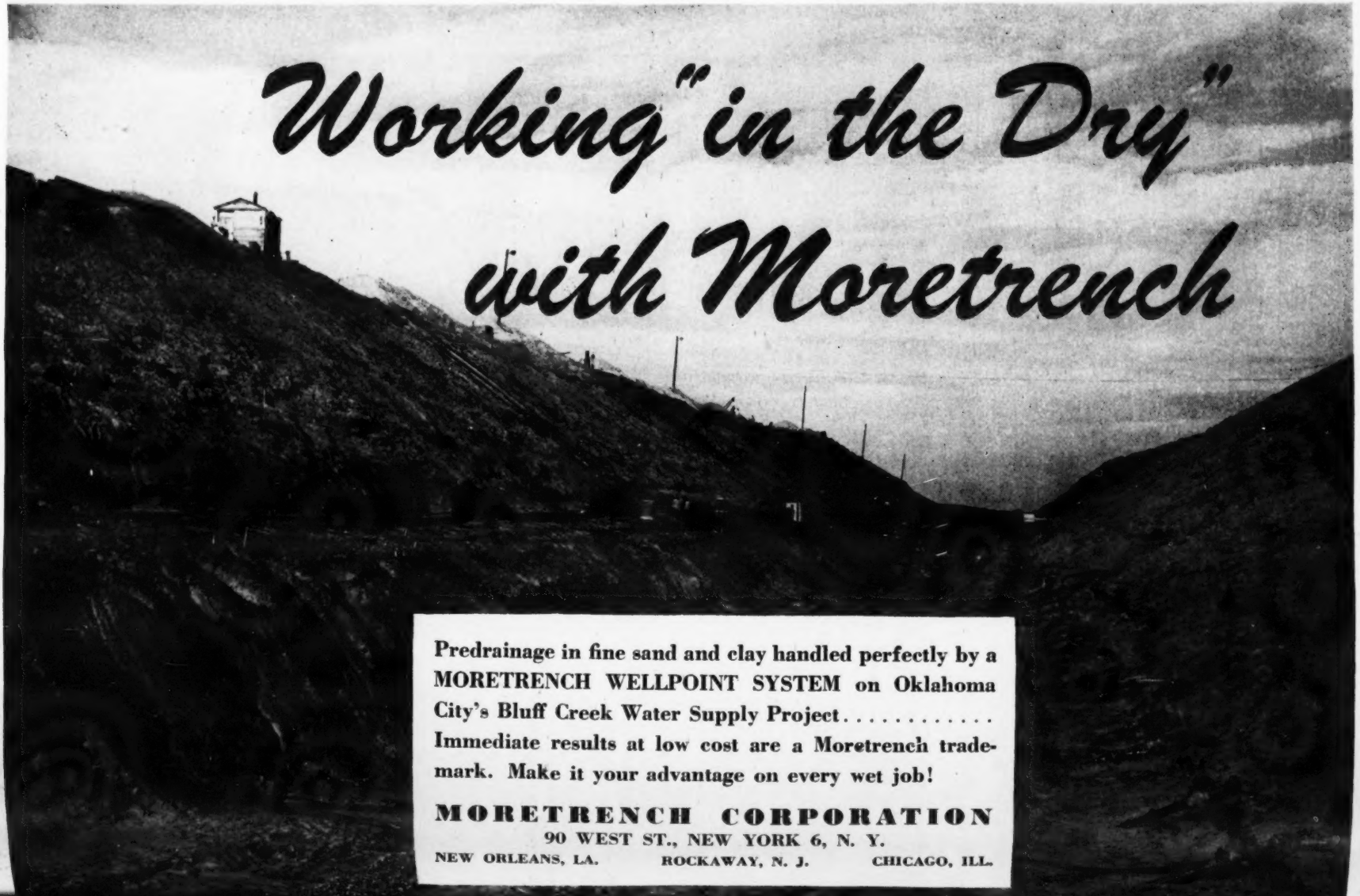
Lt.-Col. G. R. Chetwynd, who retired last April after 28 years with the Royal Canadian Engineers, has been recalled by National Defense Headquarters to continue with the engineer services in the Canadian Active Army.

Lt.-Col. Herrol J. Skidmore, McCook, Neb., is commanding officer of the 389th Engineer Regiment, which has just been assigned to Camp Butner, N. C., for additional training after having participated in functional training in California.

Captain Peter C. Killeen is the marine officer in charge of construction of a military housing project at New River, N. C., which is being erected for civilian employees at Camp Lejeune, N. C.

Gunnar Mykland, Kansas City, Mo., now on leave from his position as regional director of the Federal Public Housing authority, has been commissioned an ensign in the navy. He remains with the Office of Strategic Services in Washington, D. C. where he has been stationed several months.

John T. Rooney, former superintendent of the South Pittsburgh Water Co., has been appointed plant manager of the Monongahela Valley Water Co., Elizabeth, Pa. **Austin F. Kerin** has been named to succeed Rooney as superintendent of the South Pittsburgh company.



Predrainage in fine sand and clay handled perfectly by a MORETRENCH WELLPOINT SYSTEM on Oklahoma City's Bluff Creek Water Supply Project. . . . . Immediate results at low cost are a Moretrench trademark. Make it your advantage on every wet job!

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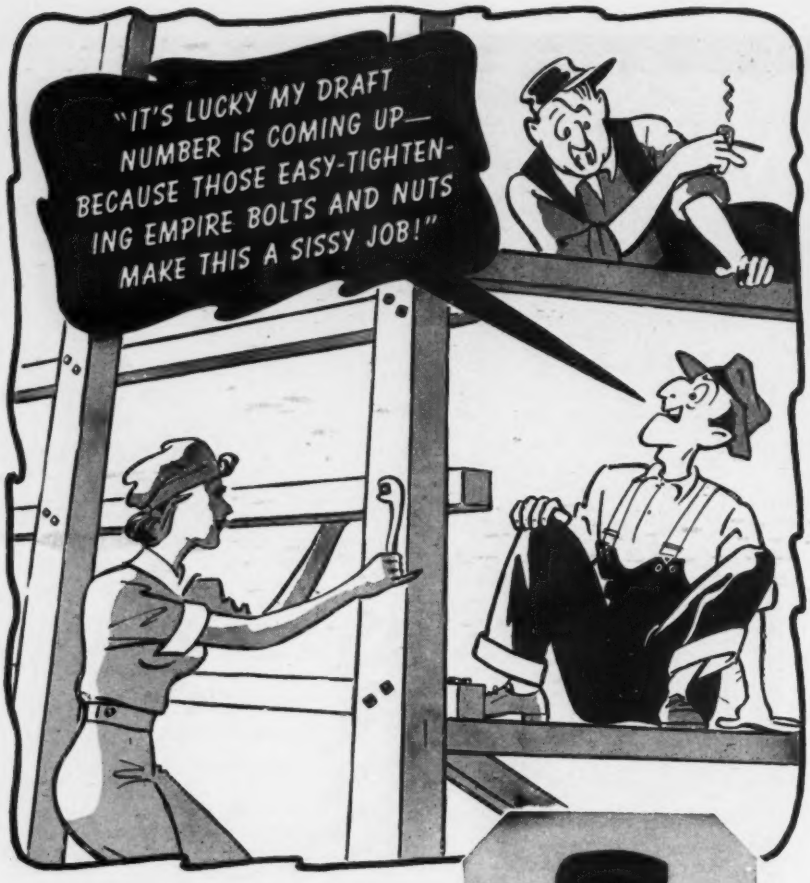
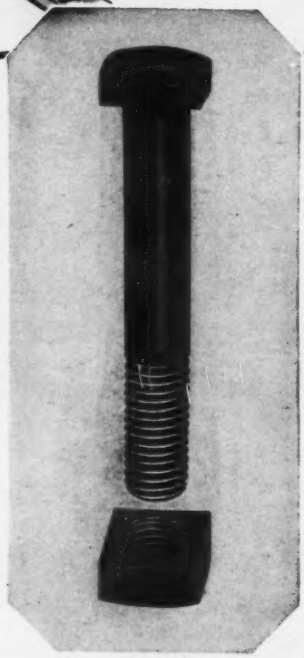
NEW ORLEANS, LA. ROCKAWAY, N. J. CHICAGO, ILL.





EMPIRE COLD-HEADED BOLTS*

STRONGER—Close-grained metal used; grain structure intensified by bolt-making processes and heat treatment.

TOUGHER—Cold-reduction of shank toughens skin surface for threading.

CLEANER—Threads *cold-worked;* strong, accurate, clean for quick assembly.

QUICKER—Point chamfered (60°) for ease in assembly.

*Up to ⅞" x 8"; larger sizes manufactured by another method.

EMPIRE NUTS*

STRONGER—Hole is punched at *right angles* to grain — no splitting.

TOUGHER—Processed to guard against stripped threads.

CLEANER—Tapping is done with frequently-changed taps.

QUICKER—Accurate tapping means nuts run on fast; counter-boring of hole means quick get-away.

*Regular nuts are processed cold through ⅞".

EMPIRE and allied fastening products since 1845

RB&W *Making strong the things that make America strong*

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Factories at Port Chester, N. Y., Rock Falls, Ill., Coraopolis, Pa.

Sales offices at Philadelphia, Chicago, Detroit, Chattanooga, Los Angeles, Portland, Seattle

BRIEF NEWS

(*Continued from p. 75*)

About 3,900 Milwaukee County (W employees will benefit by the re action of the board of supervisors w it voted to pay a monthly bonus to co pensate for the increased cost of liv The bonus will add about $800,000 to county's annual payroll.

Harland Bartholomew, who is prep ing a master plan for development of city of Dallas, Tex., has received an o of cooperation from the Texas High Commission. Chairman Brady Gentry the commission says that he is uncer as to how much money will be availa for highway improvements after the w but that the commission is willing for engineers to work with Bartholom particularly toward providing conn tions on projected inter-regional hi ways.

Bartholomew is a member of the C mittee on Inter-regional Highways wh is seeking four-lane improved highw with daily traffic counts averaging ab 1,500 vehicles. Five such highways en or pass through Dallas.

More than 700 state employees Minnesota came to the rescue of ha pressed farmers recently by volunteeri as harvest hands. Many of the employ who were freed to work in harvest fie were on maintenance crews in the st highway department, including truck a tractor drivers and other workers w skills readily adaptable to the operati of harvest equipment. Because the wo ers are in the employ of the state year, the state had available a pool manpower which could be used for ot than highway purposes, and the e ployees were asked to volunteer as h vest hands. They received standard wa in addition to their regular paychecks.

Bonneville Power Administrator P J. Raver has announced the appointm of R. F. Bessey as special adviser to t Bonneville staff. Mr. Bessey has had years experience in governmental wo his first assignment having been with t Panama Canal Commission in 1911. Sin then he has served in the War depa ment, the Navy department, the Depa ment of the Interior, the Public Wor Administration, and the executive of of the President. He has had 35 years engineering experience and has be engaged in resources and developme planning work for a number of years.

No provisions have been made to ra any of the levees in Arkansas damag by the floods of last May, although $75

RAIN, snow, hail, wind, abrasion and manhandling. These are the enemies of longer wear in tarpaulins. And these are the reasons why you should specify MT. VERNON Extra duck. For these exceedingly strong sturdy fabrics are packed full of stamina . . . long on wear, short on the need for replacement. MT. VERNON Extra duck is made only from carefully selected top grades of cotton woven to a high degree of uniformity, which adds extra strength to protective covers.

MT. VERNON WOODBERRY MILLS, INC.

TURNER HALSEY COMPANY
Selling Agents
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THREE FULLY PROVEN FEATURES

The post-war era may be years—or only a few short months away. The tides of battles and Nations are running faster and faster. Peace may fall upon us with a shattering suddenness. In the less hurried days of peace, the buying of machinery and equipment is sure to be upon a more keenly exacting basis. It is then that Layne's three great and fully proven features—Quality, Efficiency and Reliability, will reach new heights of appreciation.

Building Turbine Pumps and Well Water Systems requires skill, patience, knowledge and experience. In all of these attributes, Layne leads the world. That leadership is today, and has long been many times greater than that of any competitor. Such a record cannot be discounted.

Layne Turbine Pumps and Well Water Systems are built with the utmost precision and from the world's finest and most practical materials. They offer the highest in efficiency, longest years of life, lowest upkeep cost and the most reliable service.

For illustrated literature, address Layne & Bowler, Inc. General Offices, Memphis 8, Tennessee.

AFFILIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. * Layne-Atlantic Co., Norfolk, Va. * Layne-Central Co., Memphis, Tenn. * Layne-Northern Co., Mishawaka, Ind. * Layne-Louisiana Co., Lake Charles, La. * Louisiana Well Co., Monroe, La. * Layne-New York Co., New York City * Layne-Northwest Co., Milwaukee, Wis. * Layne-Ohio Co., Columbus, Ohio * Layne-Texas Co., Houston, Texas * Layne-Western Co., Kansas City, Mo. * Layne-Western Co. of Minnesota, Minneapolis, Minn. * International Water Supply Ltd., London, Ontario, Canada.

LAYNE

WELL WATER SYSTEMS
DEEP WELL PUMPS

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000 has been allotted for replacement and repair on 23 levees along the Arkansas River, according to officers of the Little Rock District of the United States Engineers. Only repairs are to be made at present and any increase in the protection through raising must come from a special appropriation.

Three routes for a $6,000,000 highway linking the main road networks of British Columbia to the Alaska Highway are now being surveyed. Two survey parties are mapping out these routes for the highway which would facilitate transportation of essential war equipment to the Alaska Highway, Premier John Hart has announced. The first route under survey is an extension of the road from Finlay Forks; the second a link through Pine Pass, and a third a link through Monkman Pass.

A way of overcoming the labor shortage has been originated in Halifax, N. S. Contractors have enlisted customers to solve the problem when scarcity of help has forced suspension of building operations on houses. The persons for whom the houses are being built have been asked to help with the excavations, pouring the cement and concrete work, doing rough carpentry, and acting as helpers for the experienced mechanics. As a result, whole families have joined in the house construction. The pay for the emergency workers is a deduction from the price to be paid to the contractor.

Because of the decrease in construction work, General J. S. Bragdon, head of the Southeastern division of the U. S. Army Engineers Corp., has announced the disbanding of the Atlanta district office. Projects of the Atlanta district have been divided between the Savannah and Mobile districts, he said. The procurement section of the district engineers remains in Atlanta, and has been set up as the supply section of the Southeastern Division Engineers.

Within six months the $50,000,000 Denison Dam at Denison, Tex., destined to have an ultimate rating of 50,000 kw., will be contributing to a firm power supply of about 90,000 kw. for Texas, Arkansas and Oklahoma. One of its five generating units is to be installed and will be generating power by the first of the year.

The main embankment of the dam is due to be completed in October. About 17,000,000 cu.yd. of earth are required for the embankment. In the last three years over 15,000,000 cu.yd. have been put in place.

Under the direction of the Denison District Army Engineers, work on the dam has been pushed to where over 74 percent of the spillway paving is completed and substructures for the nearly

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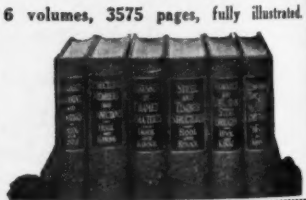

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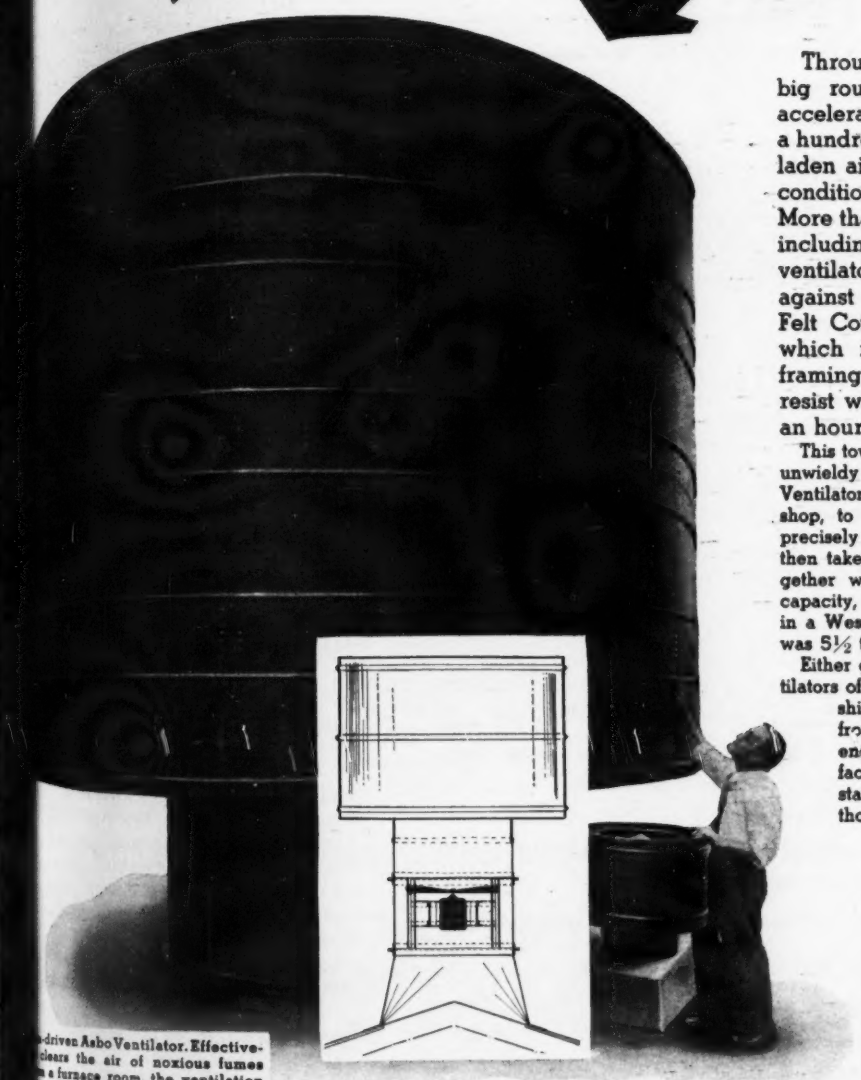
THIS GIANT *Asbo* VENTILATOR REMOVES FURNACE GASES FROM INTERIOR OF STEEL PLANT



-driven Asbo Ventilator. Effective-clears the air of noxious fumes a furnace room, the ventilation which was regarded as extremely ficult. Inside dimension of base , 96 inches; rated capacity when vity-operated (without fan) under -mile wind, 35,000 cubic feet per ute; equipped with 15-horse-er motor-driven fan, 100,000 ic feet per minute.

Through the 96-inch throat of the big round Ventilator here shown, accelerated by a 15-horsepower fan, a hundred thousand cubic feet of gas-laden air is expelled, under average conditions, every working minute. More than forty feet in overall height, including fan barrel and base, the ventilator is thoroughly protected against the elements by the use of Felt Cote Asbestos Protected Metal, which is bolted to structural steel framing members, and is designed to resist wind pressures of ninety miles an hour.

This towering air valve, assembled, was too unwieldy for shipment. Yet, like all Asbo Ventilators, it was completely set up in the shop, to make certain that every part was precisely fitted according to design. It was then taken down and carefully prepared, together with others of like dimensions and capacity, for transportation to its destination in a West Coast steel mill. Shipping weight was 5½ tons.

Either gravity-type or fan-driven Asbo Ventilators of various sizes and capacities can be shipped from stock or fabricated speedily from materials on hand. Competent engineering service and adequate shop facilities assure this performance. Installation will be promptly made by thoroughly trained crews.

Learn about the superior efficiency of Asbo design—the long service of Asbestos-Protected Metal Ventilators—the availability of other materials for special conditions. Send us rough drawings or description of roof, giving pitch, etc. Let us know your ventilating problem. We will submit proposals by mail or will send a representative if desired.

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mile-long bridge across the Wash River, designed to carry the reroute Highway 70, are finished.

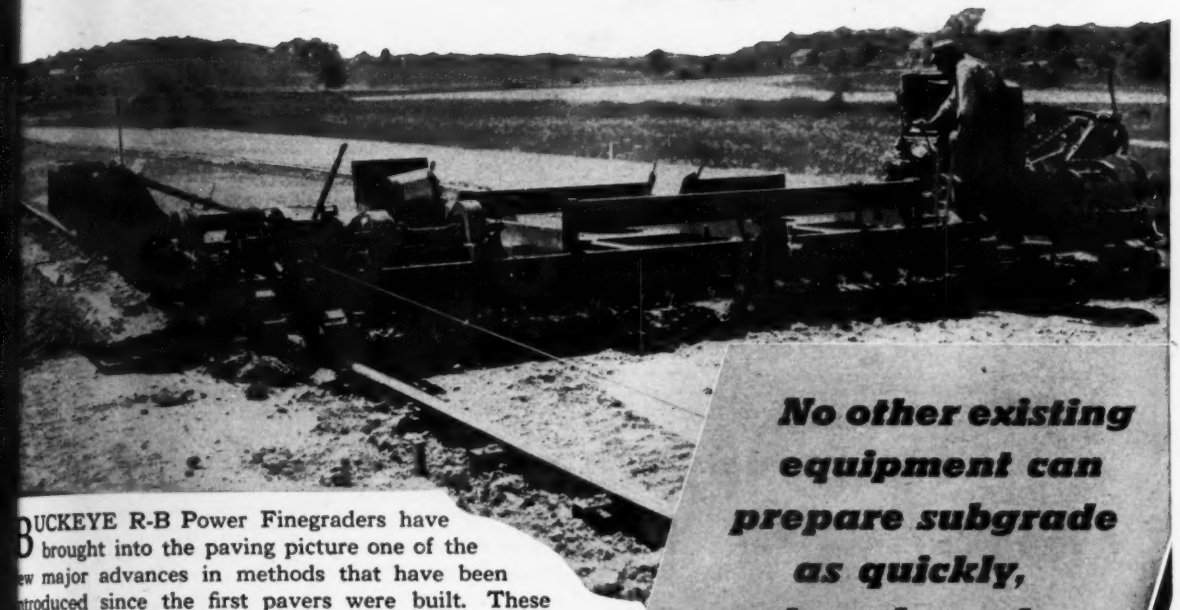
The United States Quartermaster Cor moves traffic over the Alcan Highway li a railway. Relay stations are similar railroad divisional points. Trucks co into these relay stations and are mann with new drivers replacing those w took over from other drivers 100 mi down the line. Trucks are supplied wi gas and oil at the relay stations and un are serviced and broken-down trucks r paired. Wreckers are stationed .. the v rious relay posts and go out in eith direction for half the distance betwe the relay stations to rescue casualti among the convoys along the highwa Stations are linked together by telepho and teletype lines. Convoys have to st for checking and instructions at the de patchers' office of each relay station.

The War Production Board recent halted eight highway projects recom mended for discontinuance by the Pu lic Roads Administration. The projec which if completed, would have cost total of $5,231,687, are deferred unt after the war in order to conserve ma power, equipment and materials. They a as follows: West Virginia, between Hun ington and Point Pleasant; New Jerse New Jersey Central Railroad overpass Morgan; Camden airport circle; ne bridge over Maurice River in Millvill Absecon Boulevard, bridges over Beac Thoroughfare and Venice Lagoon an roadway approaches to Atlantic Cit and Mississippi, between Gibson an Aberdeen; New York, grade crossi elimination work in the village of Have straw; Arkansas, superstructure of S line River bridge.

A NEW RETIREMENT plan providin automatic pensions at the age of 6 for the company's 5,000 employees, wi all costs borne by the firm, has bee announced by William T. Hedlund, pres dent of the Elastic Stop Nut Corp. America. The plan permits employees become contributing members of the pla after five years of service, with voluntar contributions used to increase the amou of pension and provide disability pe sions and severance benefits. The com pany manufactures a vibration-proo elastic stop nut that utilizes an ingenio engineering principle to eliminate loose ing and slippage, and is at presen engaged in volume production of th device for aircraft, tanks and othe war weapons. Plants are located i Union and Hillside, N. J., and Lincol Neb.

FOR SUSTAINED EXCELLENCE in produ tion, the Continental Rubber Works Erie, Pa., has received the White Sta

An Indisputable CLAIM



BUCKEYE R-B Power Finegraders have brought into the paving picture one of the few major advances in methods that have been introduced since the first pavers were built. These one-man operated machines, riding on the forms, slice the grade to exact cross section eliminating nearly all hand labor, reducing the loss of yield to a negligible percentage, ending penalties for thin slabs and ending the problem of keeping the grade well ahead of the paver. There are no delays with an R-B Finegrader — they move fast even in rocky soil. Many are working ahead of two 34-E pavers. They'll leave any desired amount of lines for compacting by the roller. Depth of cut is adjustable by hydraulic lifts. Two models provide cutting widths from 10′ to 25′. If you have a road or airport paving contract, R-B Finegraders will speed up the job plenty. One good job and the machine pays for itself. Full details in new Bulletin. Send for it now.

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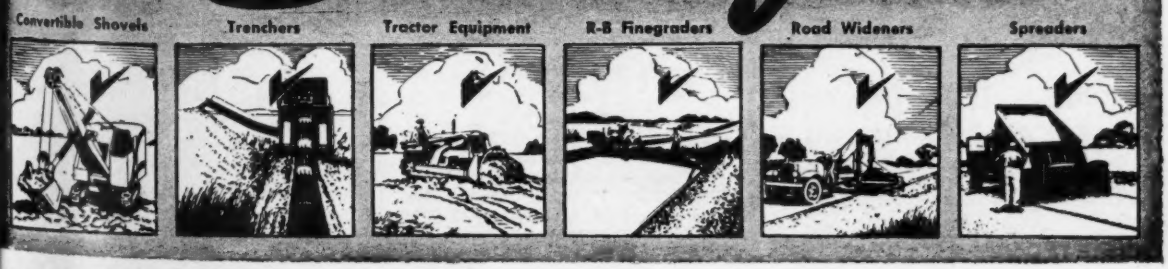

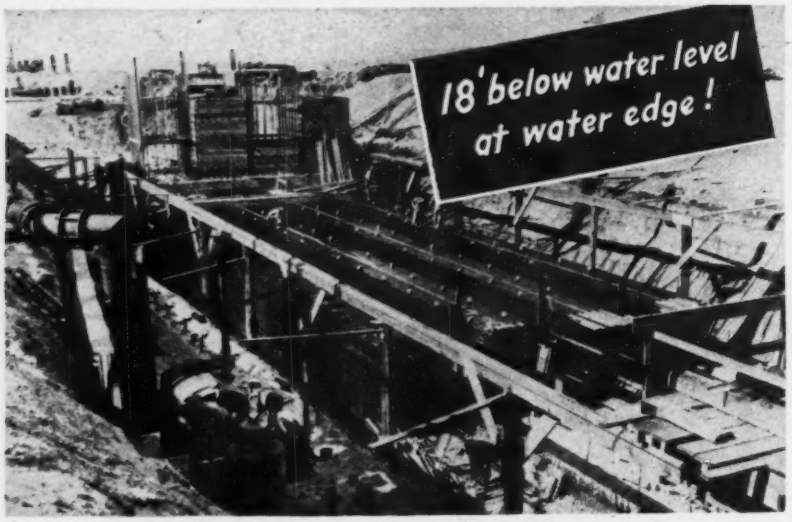

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Award denoting the maintenance of th high manufacturing standards whic brought them the Army-Navy "E" flag Continental has been producing essentia rubber components for the Chemica Warfare Department, as well as othe war products for the Army, Navy an Air Force. The White Star citation wa received by Continental at the time o its 40th Anniversary.

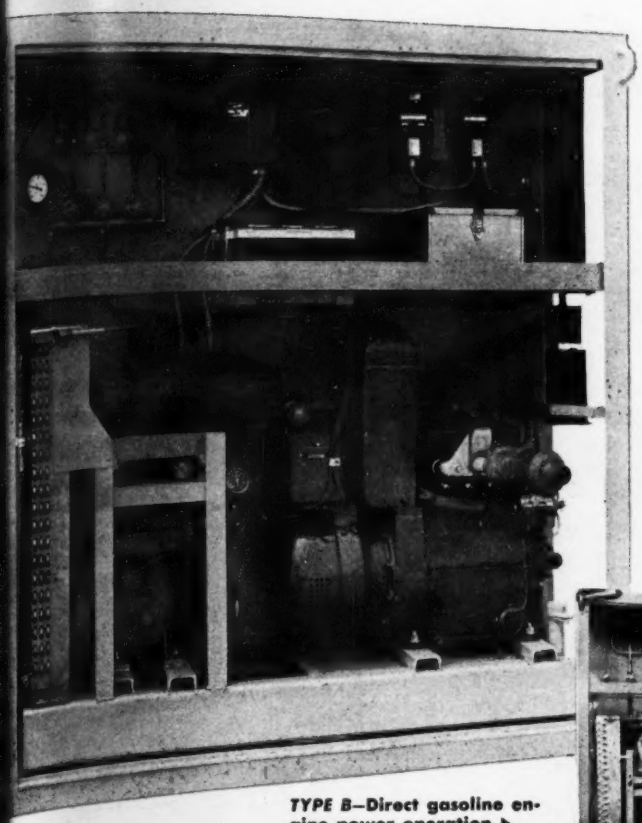
HEMAN GREENWOOD, for the past si years vice-president of the United State Steel Export Co., has been elected vice president of Carrier Corp., of Syracuse N. Y., in charge of its international divi sion. Mr. Greenwood has devoted hi entire business career to foreign trad and is well known as an authority o Latin America. Prior to his associa tion with the U. S. Steel Export Co. Mr. Greenwood was vice-president o International General Electric. He spen more than ten years in various Sout American countries where he pioneered in opening new markets.

The "Victory Scrap Bank" drive is a national all-out campaign for iron an steel scrap. Although heavier grades o scrap, from farm and industrial sources primarily are desired, all types an grades of scrap will be accepted. The drive will extend from Oct. 1 to Nov. 15 1943. The drive has been announced officially by Donald M. Nelson, chairman of the War Production Board and is en dorsed by leading representatives of the steel industry and scrap dealers through out the country. Each community wil have its own scrap stock pile or "Victory Scrap Bank." The general public is to be urged to consider these banks as sources of "metallurgical blood plasma" guaran teeing a continuing flow of vital war armaments so urgently needed for the successful continuation of our military program abroad.

Completion of work on the Alaska highway this fall is expected to release between 3,000 and 3,500 Canadian civil ians by Dec. 31, according to officials of the federal Selective Service at Edmon ton, Alta.

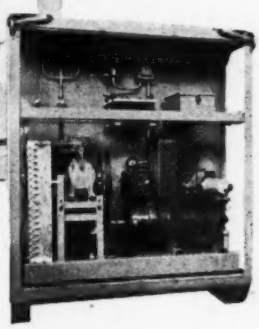
"We have been informed by the U. S. labor relations office that when the civil ian contracts are completed, probably late this fall, not more than 1,400 men out of 5,000 now up there will be needed for maintenance," said an official. It is planned to complete the graveling pro gram during the present season.

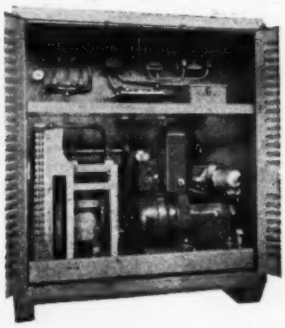
The City Council of Toronto, Ont., has decided to appoint a central purchasing agent for the city. When appointed, he will work under the Works Department which already has a large purchasing section in connection with all city engi neering work.



A portable refrigerator unit that will operate in any climatic condition on either gasoline or electric power, A.C. or D.C. current. These refrigerators may be operated at low temperatures for frozen foods or standard refrigeration temperatures for normal food protection, with an outside temperature differential of 100°.

TYPE H—(left) Gasoline powered electric generator with A.C.-D.C. motor.





TYPE B—Direct gasoline engine power operation.

TYPE U—Direct gasoline engine convertible to A.C. electric.

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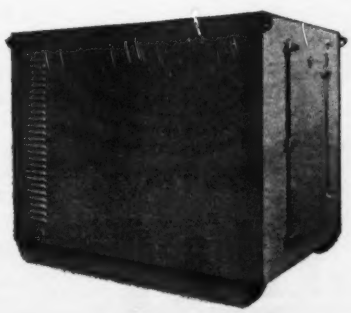
As a test, this unit was shipped by rail through 3500 miles of the toughest climatic conditions ...in operation continuously for 15 days, 24 hours a day. Automatic recording equipment indicated the box maintained an average temperature of 8° throughout the strenuous tests.

It will maintain operation continuously while en route by rail, truck or water... no refrigeration expert is required... no technical knowledge whatever is needed.



For further details in regard to this refrigerator—or for our solutions to any special manufacturing problems in connection with the war effort, write or wire today.

CAPACITY: 150 cu. ft.
SIZE: 6'x9'x7'5" high.
SHIPPING WEIGHT: 6000 lbs.

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MEETINGS

AMERICAN PUBLIC HEALTH ASSOCIATION, wartime conference and 72nd annual business meeting, Hotel Pennsylvania, N. Y., Oct. 12-14.

AMERICAN WELDING SOCIETY, 24th annual meeting, Hotel Morrison, Chicago, Ill., week of Oct. 18.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION, Westchester Country Club, Rye, N. Y., Oct. 19-21.

ENGINEERS' COUNCIL FOR PROFESSIONAL DEVELOPMENT, 11th annual meeting, American Society of Civil Engineers, 33 West 39th St., New York, N. Y., Oct. 23.

FEDERATION OF SEWAGE WORKS ASSOCIATIONS, Hotel Sherman, Chicago, Ill., Oct. 21-23.

PUBLIC WORKS CONGRESS, Hotel Sherman, Chicago, Ill., Oct. 24-27.

NATIONAL COUNCIL OF STATE BOARDS OF ENGINEERING EXAMINERS, annual meeting, Lincoln Hotel, Indianapolis, Ind., Oct. 25-26.

AMERICAN PUBLIC WORKS ASSOCIATION, Hotel Sherman, Chicago, Ill., Oct. 24, 25, 26 and 27.

NATIONAL RECLAMATION ASSOCIATION, Denver, Colo., Oct. 27-29.

INDUSTRIAL HYGIENE FOUNDATION, 8th annual meeting, Mellon Institute, Pittsburgh, Pa., Nov. 10-11.

ASSOCIATED GENERAL CONTRACTORS OF AMERICA, INC., Drake Hotel, Chicago, Ill., Nov. 1-2.

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS, annual meeting, Chicago, Ill., Dec. 1-3.

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Teco conducts a continuous research program as well as sponsoring research at outstanding engineering colleges and laboratories to increase the design knowledge of timber designers. The benefits and results of this research are passed on to interested individuals in the form of design data and improved products.
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• Williams Buckets are very much in active service in the wide-flung war offense. Concrete-hard, frozen ground is being broken by the sharp teeth of Williams Buckets in far north road building. Deep in jungles Wellman Buckets are digging and dredging. At ore mines, over stock piles and railway cars, and in steel mills Williams Buckets are literally moving mountains to help beat the Axis.

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Regional and Local Meetings

Southwest Section, American Water Works Association, Biltmore Hotel, Oklahoma City, Okla., Oct. 11-13.

Southwest Section, Water and Sewage Works Manufacturers Association, Inc., Oklahoma City, Okla., Oct. 11-13.

Missouri Valley Section, American Water Works Association, Des Moines, Iowa, Oct. 12-15.

Four-State Section, American Water Works Association, joint meeting with Pennsylvania Water Works Operators Association, wartime waterworks conference, Benjamin Franklin Hotel, Philadelphia, Pa., Oct. 14-16.

Wisconsin Section, American Water Works Association, Milwaukee, Wis., Oct. 19-20.

California Section, American Water Works Association, Biltmore Hotel, Los Angeles, Calif., Oct. 27-29.

Canadian Institute on Sewage and Sanitation, annual convention, General Brock Hotel, Niagara Falls, Ont., Oct. 28-29.

Engineers' Society of Western Pennsylvania, fourth annual water conference, William Penn Hotel, Pittsburgh, Pa., Nov. 1-2.

New Jersey Section, American Water Works Association, fall meeting, Hotel Madison, Atlantic City, N. J., Nov. 4-6.

North Carolina Section, American Water Works Association, and North Carolina Sewage Association, wartime conference, Hotel Robert E. Lee, Winston-Salem, N. C., Nov. 1-3.

Carolinas Branch, Associated General Contractors, Pinehurst, N. C., Dec. 6-7.

Elections and Activities

Don Murray has been appointed secretary of the Engineers and Architects Association of Southern California. Of a total membership of 1150 this society reports 145 are in the armed forces.

Air Vice Marshall E. W. Stedman, Ottawa, Ont., Director-General of Air Research for the Royal Canadian Air Force, has been appointed a member

CONSTRUCTION REPORTS

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ELSIE EAVES, Manager *SCOTT McLEOD, Statistician*
(Daily service also available—Write for details.

WATER SUPPLY

POSED WORK

Conn., Bridgeport—P. Wks. Dpt. making ns watermain under water between Bridge- rt and Pleasure Beach. $16,000. H. L. Row- d, City Hall, engr.

Kas., Coffeyville—J. D. Byers, mayor, City ll, completed surveys water reservoir, pro- ed new dam about 7 mi. south of Inde- ndence, impounding approx. 362,000 gal. ter. $15,000. Black & Veatch, 4706 Broad- ay, Kansas City, Mo., engrs. CD 7/6—ENR

Tex., Cuero—City, J. G. Newman, mayor, terworks imprvs., Tex. 41-610. $34,200, A. Terrell Bartlett Engineers, Transit wer, San Antonio, engrs. CD 6/4—EBE

Wash., Black Diamond—Water Dist. 66, ter sys., Project 45-268. $98,950. FWA.

Wash., Manette—N. Perry Ave. Water t., Manette, water sys., Project 45-269. 3,198. FWA. Parker & Hill, Smith Tower, attle, Zone 4, engrs.

Wyo., Laramie—City jointly with Union cific R. R., B. H. Prater, ch. engr., 1416 ge St., Omaha, Neb., chlorination plant. ,000.

Puerto Rico—Dr. A. Fernos Isern, comr. Health, San Juan, plans installing purifi- on plants for aqueducts in San Juan adilla, Arecibo, Caguas, Corozal, Guay- a, Humacao, Mayaguez, Ponce, Rio Piedras San German, also imprvs. for Villalba and ciras aqueducts, etc. Over $8,000,000.

Puerto Rico—Insular Emergency Council of erto Rico, San Juan, approved sum of $356,- for cleaning pipes and for maintenance repairs to aqueducts in 72 municipalities der sponsorship of Insular Board of Health.

Ont., Bramptonville—Municipality, author- d bond issue, water imprvs. $28,500. O. yer, Town Hall, engr.

Que., St. Colomb of Sillery (Postal Dist. Quebec City)—Municipality, c/o R. A. Len- t, 1 Alfred Roy St., Sillery, voted bonds, er and sewer imprvs. $37,000.

BIDS ASKED

Bids Asked November 2

Tex., Texas City—Galveston Co. Water trol & Imprvt. Dist. 4, Fire Station, imprv. er and sewer works, Tex. 41-596. $225,500. A. Plans deposit $50. J. J. Rady, Insur- ce Bldg., Fort Worth, engrs. CD 9/9—9/16.

Bids Asked October 12

Iowa, Des Moines—D. L. Moffit, city mgr., W. imprvs., pump house, intake pumps, ors, 3 turbines, etc. Alvord, Burdick & ckson, 30 N. Wacker Dr., Chicago, Ill., rs.

Bids Asked October 14

Que., Esquimalt—Secy. Dpt. Munitions & ply, Ottawa, Ont., exten. watermain and oil pipeline, Calwood Oil Storage, for val Natl. Defense (Sea), Ottawa, Ont. About ,000.

Bids Asked October 15

N. Y., Greenport—Village Clerk, Village ter, wells, pump, plants, delivery lines, m East Marion Dist., northeast of here, 10-142. FWA. Plans deposit $10. J. ge, mayor. Barker & Wheeler, 11 Park New York, engrs.; adv. ENR 10/7.

Bids Asked about October 18

Tex., Cuero—J. G. Bowman, mayor, City W.W. imprvs., exten., Tex. 41-610. ,000. FWA. Terrell Bartlett Engineers, nit Tower Bldg., San Antonio, engrs. 9/29—ENR 10/7.

Bids Asked October 19

S. C., Hampton—City, W.W. exten., SC 2. Est. $56,500. FWA. Tomlinson Eng. Columbia, engrs. CD 9/10—ENR 9/16.

BIDDERS

Calif., Vallejo—Federal Works Agency, Fulton St., Berkeley, fire hydrants on ing watermains, Calif. 4-126, from H. 218 California Dr., Burlingame, $19,950.

Conn., East Hartford—Metropolitan Dist. r Bureau, 650 Main St., Hartford, Sept. aying 6,600 ft. 16 and 12 in. cement lined mains in Park Ave., from R. Civitarese, Metropolitan Ave., Hyde Park, Mass., 0. CD 9/22.

CONTRACTS AWARDED

Connecticut—U. S. Eng., $19 Industrial g. Bldg., Providence, R. I., pump. station, 4-23, Hartford Co., to A. I. Savin Constr. 19 Village St., East Hartford. Est. under 0. CD 9/16.

Location of ENR Correspondents

Symbols and Abbreviations Include:

† Federal Government
★ Project of $500,000 or over
ENR Engineering News-Record
CD Engineering News-Record Construction Daily
A-E-M Architect-Engineer-Management type of contract

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or large: water supply, earthwork, waterworks, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction
(Named in order of Listing)

Water Supply	Unclassified
Sewers, Waste Disposal	Latin America
Bridges	Public Buildings
Streets & Roads	Commercial Buildings
Earthwork, Waterways	Industrial Buildings

Stages Reported

PROPOSED: (except Streets & Roads):

BIDS ASKED (new announcements only. For full calendar, see also preceding issues of ENR);

LOW BIDDERS: On jobs below $500,000 value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

Note: To comply with censorship requirements, addresses on some reports are being generalized. Data which would reveal the purpose of the improvements and the size are withheld. The name of contractor and general area are reported.

†**Ill., Great Lakes**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., reservoir, Naval Training Station, NOY 7047, to The Preload Co., 420 Lexington Ave., New York, N. Y., **$58,970.**

†**Kentucky**—U. S. Eng., 612 Federal Bldg., Louisville, 350,000 gal. open reservoir, sedimentation tank, sewers, Union Co., to Bass Eng. Constr. Co., Birmingham, Mich.

†**Nebraska**—U. S. Eng., 1709 Jackson St., Omaha, reservoir, Contr. 25-066-eng-87, Sarpy Co., to Empire Contractors, Inc., 901 S. 40 St., Omaha, **$30,000.**

†**Oklahoma**—U. S. Eng., 416 Wright Bldg., Tulsa, Zone 2, water supply, Contr. 957-eng-2141, Oklahoma Co., to Chas. M. Suttle, 12 N.W. 8 St., Oklahoma City, **$20,000.**

†**Ore., Murphy**—Murphy Ditch Assn., Murphy, 20x290 ft. rein.-con. slab, diversion dam across Applegate River, force account. FSA funds. J. Meagher, FSA, Grants Pass, engr.

Ore., Silverton—E. K. Burton, city mgr., water storage log crib dam on Abiqua Creek, force account. **$25,000.** CD 9/8—ENR 9/16.

Tenn., Memphis—Bd. Directors Memphis Light, Gas & Water Div., installing compressor at Sheahan Pump. Sta., to Worthington Pump & Machinery Corp., Iroquois Bldg., Buffalo, N. Y., **$73,546.** CD 8/24—ENR 8/26.

†**Texas**—U. S. Eng., 25 St. and Avenue F, Galveston, water treatment plant, Cameron Co., to Dodds & Wedegartner, 382 N. Bowie St., San Benito, approx. **$30,000.**

N. S., Brooklyn—Mersey Paper Co., Ltd., Liverpool, 8,600 ft. watermains, 42 in. I.D. 1⅛ in. B.C. fir staves, own forces, **$50,000.**

SEWERS, WASTE DISPOSAL

PROPOSED WORK

†**Mo., Wellston (St. Louis P. O.)**—Curtis Sewer Dist. of St. Louis Co., O. H. Stotkoe, pres. Bd. Trustees, 6313 St. Louis Ave., bids soon, combined storm water and sanitary sewerage sys. $125,000. FWA. E. A. Fulton, 3 S. Mermec Ave., Clayton, engrs. CD 9/29.

†**New York**—Federal Works Agency, 101 Park Ave., New York, 17, storm drainage sys., rein.-con. box culverts and open ditches, etc., from an area of 1,750 acres in and adjacent to Mitchel Field and Camp Mills, Nassau Co. $48,381.

†**Tenn., Memphis**—City, W. Chandler, mayor, 2 mi. lateral sewer addn., Docket Tenn. 40-242 NF-sec. 3A. $50,000. FWA.

†**Va., Portsmouth** and **Williamsburg**—Federal Works Agency, 601 State Planters Bank Bldg., Richmond, Zone 19, storm and sewer facilities, sidewalks at Portsmouth, addn. to U.S.O. Center at Williamsburg, Va. 44-324 and Va. 44-326.

†**Washington**—U. S. Eng., 800 Third Ave., Seattle, Zone 4, addnl. sewer mains, Neg. No. 766, Kittitas Co.

†**Wash., Moses Lake**—City, sewerage sys., 15,000 ft. pipe, two 12 in. pumps, lift station, chlorinator, filter, Docket 45-250. $115,300. FWA. G. D. Hall, Larson Bldg., Yakima, engr.

Puerto Rico—Insular Emergency Council of Puerto Rico, San Juan, voted $58,345 appropriation for repair and maintenance work on sewerage systems, affecting 44 municipalities.

N. B., Grand Falls—M. McCluskey, mayor, sewerage sys. imprvs. $25,000. T. A. McCann, Grand Falls, engr.

Ont., Galt—City bids soon garbage incinerator. $45,000. James, Proctor & Redfern, Ltd., Excelsior Life Bldg., Toronto, engrs. CD 9/16—ENR 9/23.

Ont., Listowel—Town, bids soon sewage disposal plant. $150,000. James, Proctor, Redfern, Ltd., Excelsior Bldg., Toronto, engrs. CD 9/20—ENR 9/23.

Ont., Oshawa—Installing sewage disposal plant. $175,000. O. C. Miller, City Hall, engr.

Que., Longueuil—D. Biger, city clk., bids soon, incinerator on Route Gentilly at city limits. $26,000. J. E. Vincent, c/o owner, engr.

BIDS ASKED

Bids Asked October 11

N. Y., Brooklyn—President Brooklyn Boro, Boro Hall, storm and sanitary sewers in Marine Pkway, each side from Fillmore Ave. to sewer summits about 330 ft. north of Fillmore Ave.

Ont., Brockville—City, H. W. Carswell, clk., 900 ft. 16 in. c.i. sewer in St. Lawrence River. About $45,000-$60,000. Gore & Storrie, 1130 Bay St., Toronto, engrs.

Bids Asked About October 16

†**Tex., Cuero**—City, J. D. Newman, mayor, sanitary sewerage sys. exten., imprvs., Tex. 41-610. **$39,600.** FWA. Terrell Bartlett Engineers, Transit Tower, San Antonio, engrs.

LOW BIDDERS

Calif., San Diego—City, City Hall, Sept. 28, trunk sewers No. 10 from Valencia Park to treatment plant, from Gogo & Rados, 10,024 S. Figueroa St., Los Angeles, **$78,418.**

†**Ky., West Point**—Federal Works Agency, 20 W. Wacker Dr., Chicago, Ill., sanitary sewers, Docket 15-109F, from Orfet Contg. Co., 5 Bway., Melrose Park, Ill., **$41,788.**

Mich., Dearborn—M. A. Stevens, city clk., City Hall, incinerator plant, Contr. 1, from Nicholas Engineering & Research Corp. 70 Pine St., New York, N. Y., **$101,750.** CD 8/26—ENR 9/2.

O., Cincinnati—Dpt. P.Wks., Div. Records, Sept. 28, grading, concrete paving, installing sewers, drains, cement walks, sodding, etc., from John B. Jurgensen, Rand Botton, Newton, Cincinnati, **$45,121.**

CONTRACTS AWARDED

†**Calif., San Diego**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., addnl. sanitary facilities, repairs to huts, Greene Farm and Camp Elliott, NOY 6962, to Baruch Corp., 625 S. Olive St., Los Angeles, **$78,365.**

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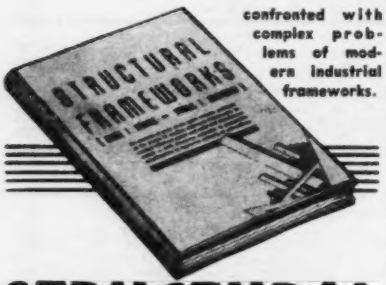

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SEWERS, etc. (Contracts Awarded, Cont'd.)

†**Neb., Bellevue**—Federal Works Agency, Court House Bldg., St. Paul, Minn., storm sewers, gravel street paving, to Empire Contractors, Inc., 901 S. 40 St., Omaha. Est. **$245,469.**

Pa., Meadville—American Viscose Corp., (Rayon), J. L. Shade, 900 Market St., Willmington, Del., sewage disposal plant, trickling filter, steel rein.-con. work, excavating to create addnl. sewage facilities, to Keystone Constr. Co., Meade St. Havens & Emerson, 1140 Leader Bldg., Cleveland, O., archts.

†**Tex., West Columbia**—City, sewer facilities, 21,620 lin. ft. collection sewers, 2 lift stations, approx. 6,000 lin. ft. force main. $85,900. **FWA.** Garrett Eng. Co., 1806 Milam St., Houston, engrs.

Ont., St. Catherines—Dpt. National Defense (Air), Ottawa, sewer and water services, etc. at No. 9 E.F.T. School, to British Canadian Constr. Co., Ltd., 157 Mavety St., Toronto, about **$35,000.**

Que., St. Joseph de Deschambault (P.O. Deschambault)—Sewers, day labor. Est. **$25,000.** Romeo Paris, Deschambault, engr.

BRIDGES

PROPOSED WORK

Kan., Kansas City—City, c/o R. Wheat, chn. Bd. Comrs., Wyandotte Co., Kansas City, Kan., preliminary surveys, estimates rebuilding Central Ave. viaduct. Sverdrup & Parcel, Railway Exchange Bldg., St. Louis, Mo., consult. engrs.

†**R. I., Newport**—H. E. Macauley, mayor, City Hall, bridge repairs, new approaches, Van Zandt Ave. $39,000. **FWA.** Chas. Maguire & Associates, 1515 Turks Head Bldg., Providence, engrs.

★**B. C., New Westminster**—Provincial Government, Victoria, new bridge over Fraser River. $2,000,009-$3,000,000.

LOW BIDDERS

Illinois—Dpt. Pub. Wks. & Bldgs., Div. Hys., Springfield, Sept. 28, imprv. rein.-con. girder bridge and paved approaches, Will Co., from Eric Bolander Constr. Co., Winchester Rd., Libertyville, **$50,644.** CD 9/22.

Louisiana—State Hy. Dpt., Baton Rouge, Sept. 29, Pass Manchac Bridge, Tangipahoa and St. John The Baptist Parishes, from Newsome Brothers Co., Columbia, Miss., **$157,353.**

New York—State Dpt. P. Wks., Div. Hys., Albany, Sept. 30, bridge, etc. 1.07 mi. Rockland Co., from A. Cardinale, Ossining, **$72,916.** CD 9/21—ENR 9/23, under Roads.

Wisconsin—State Hy. Comm., Madison, Oct. 1, Oak St. Bridge, State Trunk Hy. 71 Contr. 1, S. P. 5798, from Bigham & Resser, Winona, Minn., **$28,252.** CD 9/21—ENR 9/23.

CONTRACTS AWARDED

Arkansas—State Hy. Dpt., 1,600 ft. concrete, steel bridge across Arkansas River, Sebastian Co., to Pioneer Constr. Co., Malvern, **$338,741.** Est. $300,000. Bids 9/1. CD 9/21—ENR 9/23.

Kentucky—State Hy. Dpt., Frankfort, grading, draining, surfacing 0.195 mi., bridge and approaches on Vicco-Montgomery Creek Carr's Fork Rd., S. P. 97-242, Perry Co., to R. R. Dawson, Bloomfield, **$41,278.** Bids 9/24.

Mass., Waltham—City, P. Wks. Dpt., City Hall, stone faced bridge over Charles River, Moody St., to E. J. Rappoli Co., Inc., 515 Massachusetts Ave., Cambridge, **$134,850.** Bids 8/4. CD 8/9—ENR 8/12, under LB.

STREETS AND ROADS

PROPOSED WORK

★**Wash., Tacoma**—Pierce Co., Courthouse, 50 road and bridge imprv. projects, $1,056,600.

BIDS ASKED

Bids Asked October 13

Kentucky—State Hy. Dpt., Frankfort, grading, draining, low type surfacing 1.472 mi. Dinwood-Manton Rd., DA-RM 8, SP 36-236, Floyd Co.

Bids Asked after October 18

Tex, West University Place City (Houston)—A. L. Kerbow, mayor, asphalt and concrete topping roads. $105,000.

LOW BIDDERS

Calif., Los Angeles—Bd. P. Wks., City Hall, Sept. 22, paving Humbolt Ave. from Ave. 26 to Ave. 19, et al., from Arco Concrete Cutting Co., 2915 Derby Ave., Los Angeles, **$31,333.** L. Aldrich, City Hall, engr.

D. C., Wash. — District Comrs., District Bldg., Sept. 27, concrete paving 16,000 sq. yd. alleys, from Highway Engineering & Constr. Co., 7 and 7 Sts. N.E., **$40,866.** Est. $47,200. CD 9/21—ENR 9/23.

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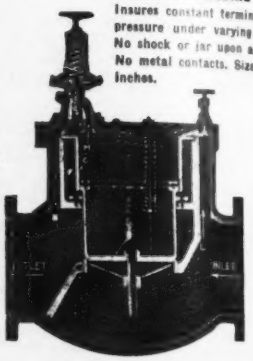

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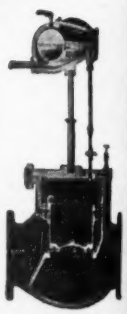

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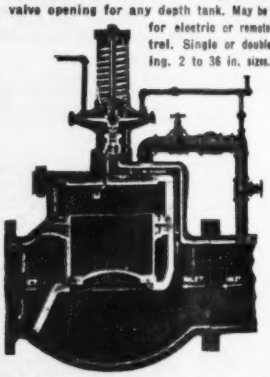

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STREETS & ROADS (Low Bidders Cont'd.)

Florida—State Rd. Dpt., Tallahassee, imprv. 2.42 mi. Orange Co., from Brinson Constr. Co., Tampa, **$386,164**; 1.953 mi. Orange Co., from Langston Constr. Co., Orlando, **$34,829**. CD 9/21.

Illinois—Dpt. P. Wks. & Bldgs., State Div. Hys., Springfield, Sept. 28, imprv. 0.56 mi. Madison Co., from Jos. Kesl & Sons Co., Bank of Edwardsville Bldg., Edwardsville, **$87,478**. CD 9/22.

Michigan—State Hy. Dpt., Lansing, Sept. 29, imprv. 5.5 mi. U. S. 12, Berrien Co., from Gould & Cross, R. R. 4, Grand Rapids, **$225,893**. CD 9/22.

New York—State Dpt. P. Wks., Div. Hys., Albany, Sept. 30, imprv. 0.58 mi. Albany Co., from Fitzgerald Bros. Constr. Co., Inc., Procter Bldg., Troy, **$28,205*****0.9 mi. Bronx Co., from Frank Mascali & Sons, Inc., 4634 Third Ave., New York, **$52,372**. CD 9/21—ENR 9/23.

Wash., Seattle—Bd. P. Wks., County-City Bldg., Zone 4, Sept. 30, resurfacing 4 Ave. S., from Prefontaine Pl. to Airport way, from Valley Constr. Co., Northern Life Tower, Zone 1, **$36,933**. Est. $38,638. CD 9/22.

CONTRACTS AWARDED

†**Arkansas**—U. S. Eng., 300 Bway., Little Rock, repairing Hy. 96, Sebastian Co., to Hill & Evans, Ft. Smith, under **$200,000**.

†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, paving, concrete barricade, central California, Spec. 1147, to Ford J. Twaits Co., Russ Bldg., San Francisco. Est. under **$120,000**.

†**Florida**—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, excav., base course, limerock draining facilities, Dade Co., to W. T. Price Dredging Corp., 3200 S.W. 27 St., Miami, Zone 33. Est. approx. **$70,000**. Awarded 9/28.

†**Fla., Jacksonville**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., road to shotgun range, MAGS, NOY 7076, to Marion Contg. Co., Ocala, **$30,325**.

†**Idaho**—U. S. Eng., Pittock Blk., Portland, Ore., access road, Ada Co., to J. A. Terteling & Sons, Robert Noble Bldg., Boise, **$147,103**. Est. $134,745.

Ia., Vinton—Bd. Supervs., Benton Co., imprv. 110,084 cu. yd. secondary roads, to B. L. Anderson, Cedar Rapids, **$203,655**. Bids 9/24. CD 9/17.

Kan., Kansas City—Wyandotte Co., grading, graveling roads, to G. Bennet Constr. Co., 1520 Central St., **$25,492**. Bids 9/21.

Kan., Pomeroy—Wyandotte Co., R. Wheat, chn., Kansas City, Kan., grading, graveling, at Wyandotte County Lake, near here, to Bennett Constr. Co., 1520 Central St., Kansas City, Kan., **$25,492**. Bids 9/21. CD 9/24—ENR 9/30, under LB

†**Maine**—U. S. Eng., 131 St. James Ave., Boston, Mass., grading, No. RN 44-12, to Susi Brothers, Pittsfield. Est. **$25,000-$50,000**.

†**New Hampshire**—U. S. Eng., 31 St. James Ave., Boston, Mass., bituminous macadam paving, No. 19-023-44-Neg-63, to Warren Bros. Roads Co., 38 Memorial Dr., Cambridge, Mass. Est. **$50,000-$100,000**.

†**North Carolina**—U. S. Eng., 308 Customhouse, Wilmington, new, altered walks, Iden. 982-44-33, Guilford Co., to F. N. Thompson, Lawyers Bldg., Raleigh, under **$50,000**.

West Virginia—Dpt. Hys., Charleston, imprv. 1.85 mi. McDowell and Wyoming Counties, to A. A. Bostic & Son, Rupert, **$18,268**; 6.371 mi. Wyoming Co., to Smith Constr. Co., Huntington, **$84,504**. Bids 9/28. CD 9/17.

W. Va., Charleston—C. B. Early, city mgr., paving, imprv. MacCorkle Ave. from west line of South Ave. Addn. to 35 St., to Cunningham & Haynes, South Charleston, **$86,038**. Bids 9/3, awarded 9/24. H. L. Campbell, city engr. CD 8/31.

Man., Shilo—Dpt. Natl. Defense (Army), Ottawa, roads and streets at Military Camp, to Bird Constr. Co., Ltd., 708 Confederation Life Bldg., Winnipeg, **$156,000**.

Ont., Camp Borden—Dpt. Natl. Defense (Army), Ottawa, surfacing Borden Alliston Rd., to Brennan Paving Co., Ltd., 400 Gage St. N., Hamilton, **$52,000**. CD 7/27—ENR 7/29.

Quebec—Dpt. Roads, Quebec City, 6 mi. municipal road, St. Liboire, to J. Naline, 351 Blvd. Charest, Quebec City, **$90,500**.

EARTHWORK, WATERWAYS

PROPOSED WORK

Calif., Los Angeles—Los Angeles Co. Flood Control Dist., 751 S. Figueroa St., Zone 14, imprv. Los Angeles River channel, White Oak Ave. to Wilbur Ave., incl. 132,000 cu. yd. excav. Over $25,000. M. E. Salsbury, 751 S. Figueroa St., Zone 14, engr.

†**Calif., Oceanside**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., engineer and architect services by Myron Hunt & H. C. Chambers, 816 W. 5 St., Los Angeles, boat basin, Camp Pendleton, NOY 7699.

†**Oregon**—U. S. Eng., Pittock Blk., Portland, revetment along Willamette River, near Jasper and revetment on McKenzie River below Coburg.

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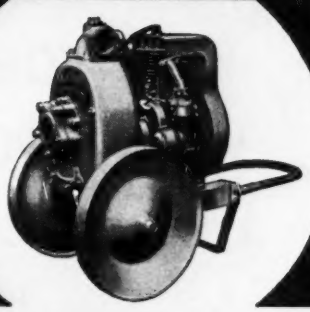

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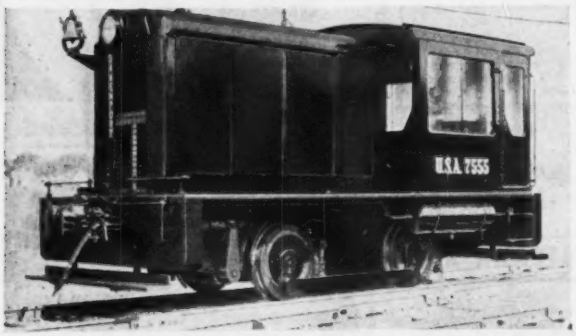

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EARTHWORK, etc. (Proposed Work Covered

N. S., Meagher's Grant—King's Co., flood control scheme in Musquodoboit Valley area, $50,000.

Ont., Riverside—L. & G. Ryan, c/o R. G. DesRosiers, 305 Guaranty Trust Bldg., Windsor, retaining wall on Detroit River, $36,900.

BIDS ASKED

Bids Asked October 11

†**Massachusetts**—U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I., dredging maintenance project, No. 41-35, Bristol Co.

Bids Asked October 14

†**Arkansas**—U. S. Eng., U. S. Post Office & Courthouse, Vicksburg, Miss., approx. 242,000 cu. yd. earthwork on Arkansas River basin, Jefferson Co.

Bids Asked October 15

†**Washington**—Bureau of Reclamation, Custom House, Denver, Colo., const. steel flanged elbows and steel castings for flanged elbows, Inv. No. E-38,411-A, and welding neck flanges and steel castings for pipe flanges, Inv. No. 38-409-A, both at Grand Coulee Dam, Columbia Basin.

Bids Asked November 1

†**Washington**—Bureau of Reclamation, Interior Bldg., 19 and C Sts. N.W., Wash., D. C., earthwork, pipelines, structures, laterals 59.3 to 69.8 and sublaterals and diversion channels, mile 38.17 to mile 49.09, Roza Div., Yakima proj., Spec. 1062.

Bids Asked November 5

Ia., Council Bluffs—City, C. A. Bowers, and, levee along Missouri River to Harrison Co. line for flood protection, $42,500.

LOW BIDDERS

†**Arizona**—U. S. Indian Irrigation Service, Poston, Sept. 16, leveling desert land for irrigation, 500,000 cu. yd. earth to be moved, from Lewis Constr. Co., 214 S. Vermont Ave., Los Angeles, Calif., at 23.8c. per cu. yd., total $119,000.

†**Arizona**—U. S. Indian Irrigation Service, Poston, Sept. 20, approx. 30 mi. flood control embankment, Bid No. CR-44-67, from Bent & Bevanda, 6950 Tujunga Ave., North Hollywood, Calif., $210,000.

Calif., Long Beach—E. J. Amar, port mgr., c/o City Harbor Dpt., 1333 W. El. Embarcadero, Sept. 28, rock levee at entrance Los Angeles River channel, from C. R. Butterfield Co., 1401 N. Gaffey St., San Pedro, $256,100. CD 9/14—ENR 9/16.

†**Mississippi**—U. S. Eng., U. S. Post Office and Courthouse, Vicksburg, Sept. 24, approx. 1,125,000 cu. yd. earthwork on east bank of Mississippi River, Solic. 22-052-44-13, Bolivar Co., from H. N. Rodgers & Sons Co., 43 E. Front St., Memphis, Tenn., 28.67c. per cu. yd. Est. $250,000. CD 9/14—ENR 9/16.

†**Washington**—Bureau Reclamation, Yakima, Sept. 27, earthwork, lining, other construction on section Yakima Ridge Canal, Roza Div., Yakima Project, Spec. 1058, from Nat McDougall Co., Sherlock Bldg., Portland, Ore., $325,068. CD 8/31—ENR 9/2.

CONTRACTS AWARDED

†**California**—U. S. Maritime Comn., Financial Center Bldg., Oakland, dredging for finger piers, Yard No. 2, to Hydraulic Dredging Co., Ltd., 1221 Central Bank Bldg., Oakland. CD 9/17—ENR 9/23.

†**Calif., South San Francisco**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., waterfront constr. and piling, NAAF, Mills Field, NOY 4422, to Healy Tibbitts Constr. Co., 1100 Evans Ave., San Francisco, $196,822.

Idaho, Lardo (Mail McCall)—Lake Reservoir Co., McCall, concrete dam at outlet Payette Lake, to J. A. Terteling & Sons, Robert Noble Bldg., Boise. Est. $55,000.

†**Washington**—U. S. Eng., 800 3 Ave., Seattle, 4, drainage sys., King Co., to D. F. Whittaker, Central Bldg., Seattle, 4, $196,000.

UNCLASSIFIED

PROPOSED WORK

†**Delaware**—FACILITIES—U. S. Eng., Commercial Trust Bldg., B and King Sts., Wilmington, bids soon addnl. facilities, Sussex Co. CD 9/27.

Louisiana — OIL PIPELINES — The Texas Pipe Line Co., Texas Co. Bldg., Houston, Tex., installation, maintenance 6 in. oil pipelines across Bayou Tigre, Vermilion Parish, across Bayou Carlin (Delcambre Canal), subdivision of Bayous Petit Anse, Tigre and Carlin proj., Iberia Parish.

Louisiana — OIL PIPELINE — The Texas Pipe Line Co., Texas Co. Bldg., Houston, Installation, maintenance 6 in. oil pipeline across Bayou Petit Anse, subdivision of Bayous Petit Anse, Tigre and Carlin Proj., Iberia Parish.

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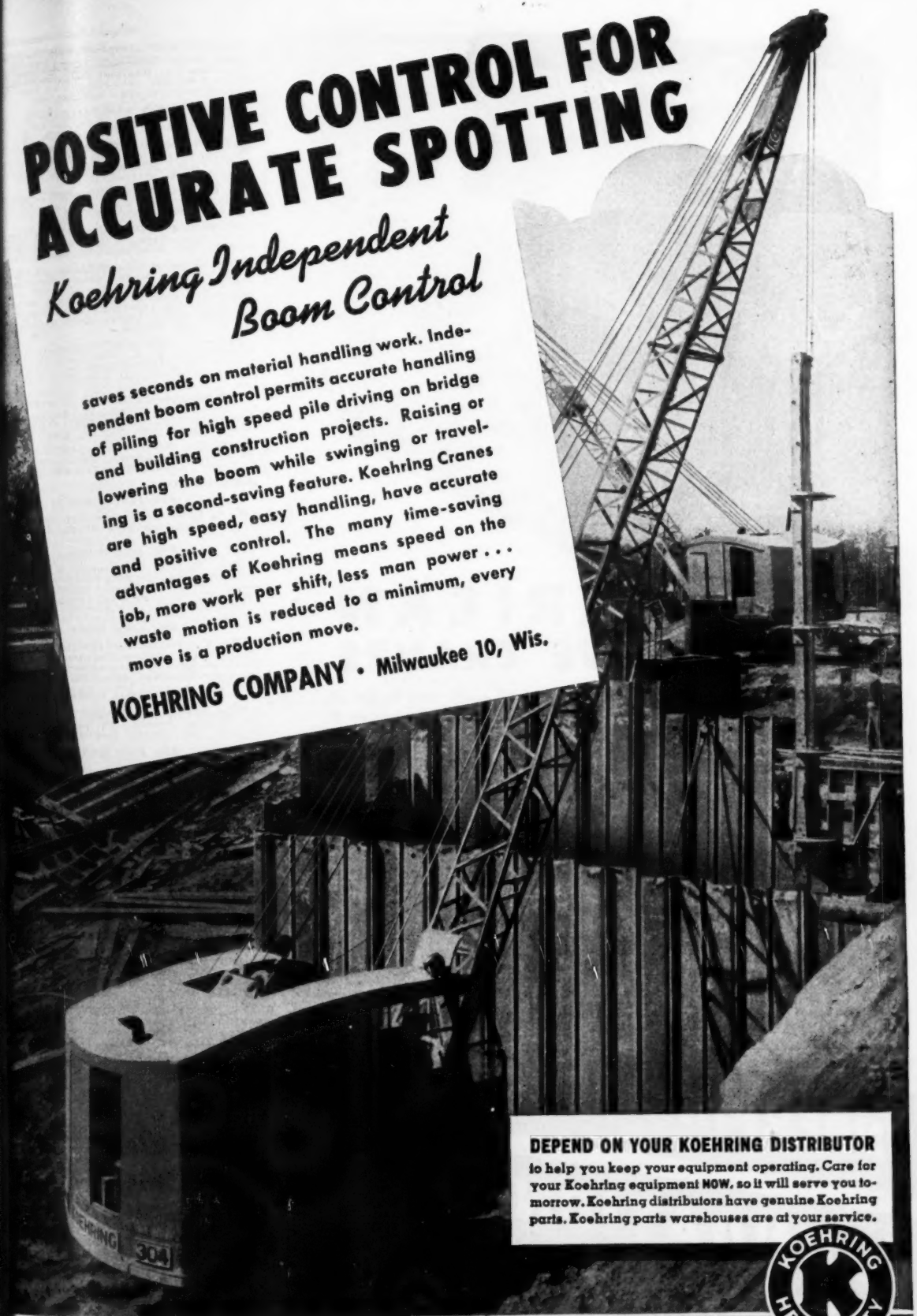

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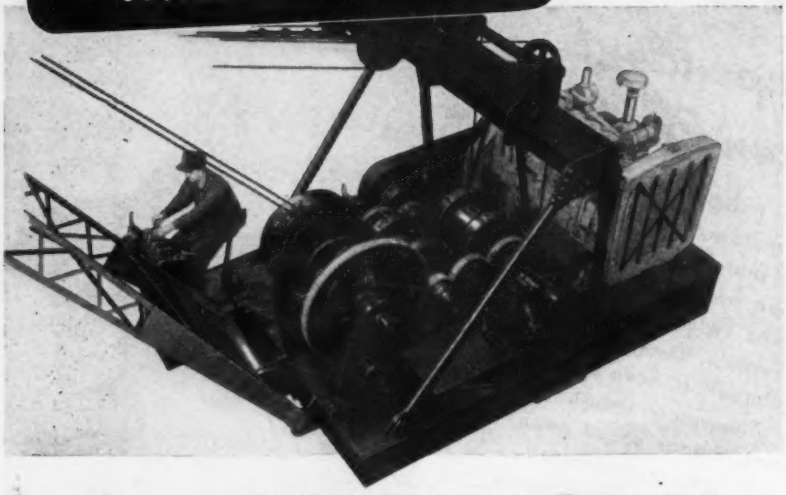

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UNCLASSIFIED (Proposed Work, Cont'd.)

La., Hope Villa—OIL WELLS—Shamrock Oil & Gas Co., Kaufman Bldg., Baton Rouge, drilling, casing, developing 2 or more deep test oil wells, storage facilities, etc.

†Massachusetts — IMPROVEMENTS—Yards & Docks, Navy Dpt., 14 St. and Constitution Ave. N.W., Wash., D. C., imprvs. $275,000.

★**†Mississippi** — IMPROVEMENTS—U. S. Eng., Grant St. west of Westwood Rd., Mobile, Ala., bids soon, imprvs., Adams Co. $600,000. CD 6/11—ENR 6/17.

O., Berea — SWIMMING POOL — Baldwin-Wallace College, 25x60 ft. swimming pool, $100,000-$150,000.

†Oklahoma—IMPROVEMENTS—U. S. Eng., 416 Wright Bldg., Tulsa, Zone 2, improvements, Sol. 957-Neg-44-30, Garfield Co.

Pennsylvania—OIL WELLS, etc.—Clinton Oil & Gas Co., Warren, development potential crude oil and natural gas area, incl. drilling unspecified number 1,800 ft. wells, connecting and gathering pipelines, tank storage facilities, adjacent to Cherry Grove oil pool, Warren Co. over $40,000.

†Texas — IMPROVEMENTS — U. S. Eng., Albuquerque, N. M., imprvs., addnl. parking aprons, Sol. 29-005-Eng-44-33, Ward Co. Project abandoned. CD 9/14—ENR 9/16 under CA.

†Washington—SPUR TRACK PIER, etc.—U. S. Eng., 800 Third Ave., Seattle, Zone 6, spur track pier, Neg. No. 758, and pier alterations, repairs, Neg. No. 759, King Co.

★**†Pacific Northwest** — AIRPORT — Civil Aeronautics Admin., Boeing Field, Seattle, Wash., airport, over $500,000.

BIDS ASKED

Bids Asked October 12

N. S., Canso—WHARF—Secy. Dpt. P. Wks., Ottawa, Ont., repairing wharf. $26,000. CD 8/10.

Bids Asked October 14

Que., Riviere Au Renard—WHARF—Secy. Dpt. P. Wks., Ottawa, Ont., reconstruct shore portion of wharf. $50,000. Plans deposit $25. Dpt. P. Wks., Ottawa, engrs. CD 8/10—ENR 8/19.

Bids Asked October 15

†N. Y., Dansville—AIRPORT IMPROVEMENTS—Civil Aeronautics Admin., LaGuardia Field, Jackson Heights, airport imprvs., lighting sys. Extended date. CD 9/22.

Bids Asked October 19

†Fla., Milton — AIRPORT PAVING — Civil Aeronautics Admin., 84 Marietta St. N.W., Atlanta, Ga., airport paving, etc.

Bids Asked October 26

★**Mass., East Boston**—IMPROVEMENTS—Commonwealth of Mass., Div. Waterways, Dpt. P. Wks., 100 Nashua St., Boston, imprvs., filling, dredging. Total est. $4,000,000-$5,000,000. CD 9/20—ENR 9/23.

LOW BIDDERS

Calif., San Francisco—PIER FENDER LINE, etc.—Bd. State Harbor Comrs., Ferry Bldg., Sept. 29, reconstructing fender line and pile clusters of Pier 4e, from Mercer-Fraser Co., 2 and Commercial Sts., Eureka, $75,224; paving areas adjoining Facilities 90 and 92 on San Francisco waterfront, from A. G. Raisch, 200 Market St., San Francisco, $80,232. CD 9/21.

†Me., Waterville — IMPROVEMENTS—Civil Aeronautics Admin., P. O. Box 636, La Guardia Field, Jackson Heights, N. Y., Sept. 25, imprvs., grading, drainage, etc., Proposal 14-252, from E. Rogers, Gardiner, $40,9[illegible] CD 9/15.

†N. M., Hobbs — AIRPORT — Civil Aeronautics Admin., P. O. Box 1689, Fort Worth, Tex., airport imprvs., Schedules 1 and 2, from Bell & Braden, Amarillo. $156,415. CD 9/2[illegible]

†Texas—IMPROVEMENTS—U. S. Eng., [illegible] St. and Avenue F, Galveston, imprvs. bids Sol. 359,44-C26, Galveston Co., from McGowan Bros., Bankers Mortgage Bldg., Houston, approx. $200,000, from A. L. Hays, 619 Bla[illegible] St., Port Arthur, approx $200,000.

★**†Tex., El Paso**—AIRPORT—Civil Aeronautics Admin., P.O. Box 1689, Fort Worth, airport imprvs., Proposal 444-638, incl. grading, drainage, conditioning and paving, Schedule 1, from Texas Bituithic Co., P.O. Box 5297, Dallas, $94,800***Schedule 2, from Hargrave Constr. Co., Cedar Rapids, Ia., $67,1[illegible] ***Schedules 1 and 2 from Standard Paving Co., & Layman Constr. Co., Tulsa, Okla., $[illegible] 925. CD 9/14—ENR 9/16

†Wis., Janesville—AIRPORT—Civil Aeronautics Admin., 608 S. Dearborn St., Chicago, Ill., Sept. 28, airport, for Rock Co., from Raemble & Madden, Box 340, Middleton, $158,167. CD 9/14—ENR 9/16.

CONTRACTS AWARDED

★**†Arizona**—IMPROVEMENTS—U. S. Eng., 751 S. Figueroa St., Los Angeles, 14, Calif., imprvs., No. 209, Cochise Co., to Basich Bros. Constr. Co., P. O. Box 151, Alhambra, Calif., $700,000-$800,000. Awarded 9/24. (Correct—contractors name and cost.) CD [illegible] under CA.

CLASSIFIED (Contracts Awarded, Cont'd.)

Ark., Texarkana—AIRPORT—Civil Aeronautics Admin., Box 1689, Fort Worth, airport imprvs., Prop. 444-635, Schedules 1 and 2, incl. clearing, grubbing, excav., etc., to J. C. Campbell Co., 86 Crockett St., Shreveport, La., approx. $25,000. CD 9/9—ENR 9/16.

California — FILL — H. J. Kaiser Co., Shipham Sq., Bldg., Oakland, rock fill, at Shipyards 1 and 2, to J. L. Martin, 1548 Mantray St., Richmond. Federally financed.

Calif., Corona — SOIL STABILIZATION, SEEDING—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., soil stabilization and seeding for dust prevention, Naval Hospital, NOY 7176, to Wilson Simpson Constr. Co., 1007 Architects Bldg., Los Angeles, $103,917.

Calif., Santa Barbara — CRASH BOAT DOCKING FACILITIES—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N. W., Wash., D. C., docking facilities for crash boat, MCAS, NOY 6699, to Hull, Small & Johnson, Inc., 1032 Avalon Blvd., Wilmington, $51,485.

Calif., Terminal Island — NAVAL AIR STATION SEAWALL—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N. W., Wash., D. C., imprv. seawall and repairs, Naval Air Station, NOY 6824, to Pozzo Constr. Co., Los Angeles, $89,964.

Florida — SAND-TRAP GROINS — U. S. Engr., 575 Riverside Ave., Jacksonville, Zone 2, repairing, exten. sand-trap groins, Neg-Jax-43-936, St. Johns Co., to Hillyer & Lovan, 111 W. Ashley St., Jacksonville, Zone 2, approx. $50,000. Awarded 9/20.

Florida — WARM-UP PLATFORMS — Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., exten. warm-up platforms in Sanford, Deland, Lake Vero Beach, Daytona Beach, Melbourne Ft. Lauderdale, NOY 6874, to Swords-Dougal Co., and Ely Dredging & Constr. Co., 217 N. Adams St., Peoria, Ill., $523,582.

Florida—GRASSING and GRADING—U. S. Engr., 575 Riverside Ave., Jacksonville, Zone 2, grassing and grading, Neg-Jax-44-195 Duval Co., to B. B. McCormick & Sons, Graham Bldg., Jacksonville, Zone 1, approx. $100,000. Awarded 9/21.

Florida—RAILROAD TRACK—U. S. Engr., 575 Riverside Ave., Jacksonville, Zone 2, railroad track, Neg-Jax-44-154, Hillsborough Co., to Cone Bros. Constr. Co., Caesar and Cumberland Rd., Tampa, Zone 1, approx. $80,000. Awarded 9/27.

Fla., Dinner Key—HANGAR—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., purchase and erect steel for hangar, at Navy Air Field, NOY 6431, to The Steel Construction Co., 720 4 St., Birmingham, Ala., $124,990.

Fla., Ft. Pierce—FACILITIES—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., addnl. facilities, amphibious training base, NOY 6671, to Paul Smith Constr. Co., 3301 N. Miami Ave., Miami, $209,000.

Fla., Miami—HANGAR, etc.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., completing hangar and lean-tos and paved paving area, Miami Municipal Airport, NOY 6431, to Hillyer & Lovan, 111 W. Ashley St., Jacksonville, $94,492.

Fla., Pensacola—GAS DISTRIBUTION FACILITIES—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N. W., Wash., D. C., gas distr. facilities, Bronson Field, NOY 6431, to Noonan & Soule, Pensacola, $32,500.

Ga., Granger-Woodward—NEW GRADE and TRACK—Chicago, Milwaukee, St. Paul & Pacific R. R., W. H. Penfield, ch. engr., Union Station, Chicago, Ill., 7 mi. grading, to J. S. Coughlin & Sons, 710 Walnut Bldg., Des Moines; laying track, own forces. Est. $1,000,000.

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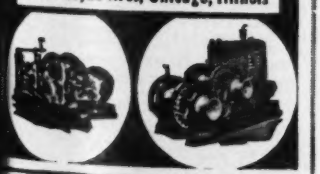

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UNCLASSIFIED (Contracts Awarded, Cont'd

†Maine—ELECTRICAL CONSTRUCTION—U. S. Eng., 21 St. James Ave., Boston, Mass., electrical construction, incl. conduit, etc., 19-023-44-Neg-61, Arrocostook Co., to Andrew Coffey Co., 22 Shawmut Ave., Boston, Mass., Est. $80,000. Bids 9/24.

†Maryland — FACILITIES — U. S. Engr., Standard Oil Bldg., Baltimore, addnl. facilities, Contr. 18-020-eng-55, Harford Co., to B. Perini & Sons, Inc., Framingham, Mass., $100,000.

†Massachusetts — IMPROVEMENTS — U. S. Eng., 31 St. James Ave., Boston, imprvs., No. 19-023-44-Neg-58, to S. Rotondi & Sons, Inc., Franklin St., Stoneham, Est. under $50,000. CD 9/21—ENR 9/23.

Mass., Haverhill — RAIL SALVAGE — City Engineer, City Hall, removing street rails on certain streets to John Condon, Coolidge Hill Rd., Watertown, Mass., Est. $80,000. Bids 9/30. Morse, Dickinson & Goodwin, 25 Washington Sq., engrs.

†Minn., Minneapolis — HANGARS, etc., Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N. W., Wash., D. C., 2 wood hangars, 1 lean-to, Naval Air Station, NOY 7451, to Standard Constr. Co., 604 National Bldg., $191,400.

†Missouri—IMPROVEMENTS—U. S. Engr., 10 E. 17 St., Kansas City, Mo., imprvs., drainage ditch closure, Maries Co., to E. J. Fiala, 1512-a Burd St., St. Louis, $43,330.

†Nebraska—FACILITIES—U. S. Eng., 15 Jackson St., Omaha, addnl. facilities, Contr. 25-066-eng-111, Ramsey Co., to Midwest Contgr. Co., 854 Builders Exchange, Minneapolis, Minn., $50,000.

†Nebraska — ELECTRICAL INSTALLATIONS—U. S. Eng., 1709 Jackson St., Omaha, imprvs., electrical installations, Buffalo Co., to Bradley-Dodson-Grafentine, 210 S. 12 St., Omaha, under $50,000.

†Nebraska—IMPROVEMENTS—U. S. Engr., 1709 Jackson St., Omaha, imprvs., gravel surfacing, Buffalo Co., to Green & Groesbeck, P. C., Masonic Temple Bldg., Des Moines, Ia., under $50,000.

†N. J., Atlantic City—NAVAL AIR STATION BUILDING—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N. W., Wash., D. C., synthetic trainer bldg., Naval Air Station, NOY 6799, to Frank H. Wilson, Armour, Pa., $49,318.

†New Mexico — IMPROVEMENTS — U. S. Eng., 4 and Gold Sts., Albuquerque, imprvs., Otero Co., to Western Contg. Corp., 2100 4 St., Sioux City, Ia., $286,000. Bids about 9/8. CD 9/1.

†New York—CONSTRUCTION—U. S. Engr., 120 Wall St., New York, Zone 5, miscellaneous construction, Contr. 30-075-eng-120, Suffolk Co., to John H. Eisele Co., Inc., 18 E. 41 St., New York, $60,000.

†New York — FACILITIES — U. S. Engr., Chimes Bldg., Syracuse, addnl. facilities, Contr. 321-eng-1006, Oneida Co., to Rathbone, Walsh, Inc., 36 Broad St., Port Chester, $100,000.

†New York — PARKING APRON — U. S. Eng., Chimes Bldg., Syracuse, addnl. parking apron, Contr. 321-eng-1007, Oneida Co., to Clinton Asphalt Co., 308-16 St., Union City, N. J., $200,000.

†North Carolina—IMPROVEMENTS—U. S. Eng., 308 Customhouse, Wilmington, imprvs., addnl. facilities, No. 982-44-34, New Hanover Co., to P. S. West Constr. Co., Statesville, under $50,000. Bids 9/15.

†North Carolina—IMPROVEMENTS—U. S. Eng., 33 Customhouse, Charleston, S. C., imprvs., bldgs., No. 231-44-27, Robeson Co., to Boyle Constr. Co., Sumtem, S. C., under $50,000. Bids 9/27.

†North Carolina—MOCK-UP FORTIFICATIONS—U. S. Eng., 308 Customhouse, Wilmington, mock up fortification for training aids, Iden. 982-44-4, Durham Co., to W. H. Baker Constr. Co., Durham, under $50,000. Bids 8/11, awarded 9/20. CD 8/10.

†Ohio—GRADING, SEEDING, etc.—U. S. Eng., 925 New Federal Bldg., Pittsburgh, Pa., grading, seeding, sidewalks, Contr. 34-044-eng-82, Cuyahoga Co., to The Curro Construction Co., Green St. and Glenridge Rd., Cleveland, $100,000.

†Pa., Phila.—RUNWAY LIGHTING—Yards & Docks, Navt Dpt., 18 St. and Constitution Ave. N. W., Wash., D. C., Mustin Field, runway lighting, Navy Yard, NOY 6724, to Electric Constr. Co., Inc., 106 Fairmount Ave., $25,000.

†Texas—AIR CONDITIONING—U. S. Engr., Fort Sam Houston, air-conditioning, Webb Co., to Southern Refrigeration Co., 2700 Elm St., Dallas, $20,000-$25,000.

†Texas—IMPROVEMENTS—U. S. Eng., Ft. Sam Houston, imprvs., Midland Co., to Mclellan, Brown & McLellan, 2216 Franklin Ave., Waco, approx. $25,000.

†Texas—IMPROVEMENTS—U. S. Eng., 2 W. Main St., Denison, imprvs., Palo Pinto Co., to H. Newton, Brownwood, $25,000.

†Texas—TAXIWAY—U. S. Eng., 416 Wright Bldg., Tulsa 2, Okla., taxiway widening, Contr. 957-eng-2140, Dallam Co., to Wm. Walton, t/a Walton & Co., 506 National Reserve Bldg., Topeka, Kan., $100,000.

CLASSIFIED (Contracts Awarded, Cont'd.)

Texas—IMPROVEMENTS—U. S. Eng., Fort n Houston, imprvs., Hays Co., to Briggs & ilan, Sunset Rd., San Antonio, approx. ,000.

Texas—IMPROVEMENTS—U. S. Eng., Fort n Houston, imprvs., water supply wells, sland Co., to McLellan, Brown & McLellan, 5 Franklin St., Waco, approx. $15,000. 9/21—ENR 9/23.

Tex., Corpus Christie—PHYSICAL TRAIN- G FACILITIES—Yards & Docks, Navy 18 St. and Constitution Ave., N. W., sh. D. C., physical training facilities, swimming pool, NATC, NOY 6227, to P. McNeel Co., Inc., 1520 Main Ave., Antonio, $300,000. CD 9/21.

Utah—IMPROVEMENTS—U. S. Eng., 32 change Pl., Salt Lake City, imprvs., to A. Garruth & Son, Evanston, Wyo., about ,000. Bids 9/24; imprvs., to O'Connor & ndenhall, Springville, approx. $80,000; h Tooele Co.

Utah—LOADING APRONS, etc.—U. S. Eng., Exchange Pl., Salt Lake City, loading and ontamination aprons, to Ford J. Twaits, Boston Bldg., Salt Lake City, Zone 1, prox. $40,000. Bids 9/24.

Virginia—RAILROAD CROSS TIES, etc.— S. Eng., Fort Norfolk, Norfolk, furnishing, alling railroad cross ties, installing turn- , track, furnishing, placing railroad bal- crushed stone, etc., Contr. 616-eng-2628, rwick Co., to Sutton Co., Inc., Radford, ,000.

Washington—TAXIWAYS and RUNWAYS ards & Docks, Navy Dpt., 18 St. and Con- tution Ave. N. W., Wash., D. C., new taxi- ys, widening existing runways, Naval Air tion, Whidbey Island, NOY 6355, to Austin 177 Dexter-Horton Bldg., Seattle, $188,500.

Washington—CONSTRUCTION—U. S. Eng., Third Ave., Seattle, Zone 4, addnl. con- ction (unspecified), Grant Co., to Wood- th & MacDonald Bldg. Co., 1123 East D Tacoma, $700,000.

Washington—UTILITY YARD—U. S. Eng., Third Ave., Seattle, Zone 4, utility yard, homish Co., to Gansland Constr. Co., P. O. 595, Ellensburg, $30,000.

Wash., Camp Borden—IMPROVEMENTS— National Defense (Air), Ottawa, imprvs., L E.F.T. school, to W. B. Sullivan Constr. 30 Bloor St. W., Toronto, about $75,000.

N. B., Pennfield—IMPROVEMENTS—Dpt. Transport, Ottawa, Ont., addnl. develop- t imprvs., incl. drainage, hard-surfaced strip, runways, etc., to Rayner Constr. Ltd., Leaside, Ont., about $590,000. CD —ENR 9/5.

LATIN AMERICA

Ecuador, Guayaquil—Public Health Dpt. of ublic of Ecuador, Quito, plans construc- 200 bed capacity maternity and childrens ital. $275,000.

Mexico and Texas—National Railways of xico (Ferrocarriles Nacionales de Mexico), Bolivar St., Mexico City, Margarito Ra- ez, gen. mgr., L. F. Reina, ch. engr. plans addnl. rehabilitation of railroads, ernment-owned, between Nuevo Laredo, xas Border), U.S.A. and Mexico City and astern sect, new equipment, maintenance, $1,400,000.

Mexico and Texas—Republic of Mexico, xico City, jointly with Canada and the ted States, plan constructing airports, re- ving railroads, constructing new roads, ral hotels to provide tourist accomoda- approximately every 100 mi. along Pan- rican Hy., in Mexico, starting at Laredo, U. S. A. border to Central American der.

Mexico—National Railways of Mexico rrocarriles Nacionales de Mexico) 19 var St., Mexico City, Margarito Ramirez, mgr., L. F. Reina, ch. engr. M.W., will truct new cement-iron bridge to replace destroyed by fire, near Monterrey, Nuevo State, to connect stations of San Carlos Tasquita, by regular railroad bridge s. $65,000.

Mexico—State of Nuevo Leon, Monterrey, J. de la Garcia, Governor, takes bids time in October, constructing hospital, e of Nuevo Leon. $350,000. CD 9/17— 9/30.

Mexico, Mazatlan—United States Plywood . 616 W. 46 St., New York, N. Y., U.S.A., tructing, equipping plywood plant.

Mexico, Mexico City—Radio Station XEOY, known as radio Mil), A. Harmony, mgr., c/o Radio Station XEOY, Paseo Reformer, Mexico, D. F., plans large addn. resent radio station, XEOY, to house sev- offices, 3 large studios, etc., at station Y, paseo de reformer. $100,000.

Mexico, Vera Cruz—Petroleos Mexicanos Oil Poza Rica fields, Vera Cruz, takes bids days, hospital for oil workers and school children of the employees, at Poza Rica Vera Cruz State. $500,000.

Peru, Lima—Pub. Bldgs. Branch, of Repub- of Peru, Lima, plans tuberculosis sani- m, Lima, and 60 bed institution, Chim- $300,000.

MEMO

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TO: Purchasing Agent

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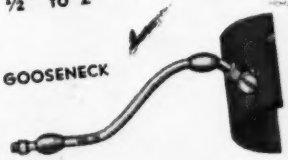

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PUBLIC BUILDINGS

PROPOSED WORK

†**Ala., Mobile**—Pub. Housing Auth., NH... Georgia Savings Bank Bldg., Peachtree ... Broad Sts., Atlanta, Ga., 700 permanent fa... ily dwelling units, Ala. ...

†**California**—Yards & Docks, Navy Dpt., ... St. and Constitution Ave. N.W., Wash., D. ... engineering services by Holmes & Narv... Co., 623 S. Spring St., Los Angeles, for ... out of CPFF and administration new ... sum contracts, 11th Naval Dist., NOY ...

†**Calif., Alameda**—Home Owners' Loa... Corp., 1440 Broadway, Oakland, Zone ... plans by P. H. Hammarberg, 2 Norberg Ave... Berkeley, converting residence at 1500 Ce... tral Ave. into 3 living units, Case No. W-... 115. $6,000.

†**Calif., Hayward**—Home Owners' Loa... Corp., 1440 Broadway, Oakland, Zone ... plans by P. H. Hammarberg, 2 Norberg Ave... Berkeley, converting residence at 3040 Co... lege Ave., into 3 living units, Case No. W-... 1027. $6,000.

†**Calif., Hunters Point**—Yards & Docks, ... Navy Dpt., 18 St. and Constitution Ave. N.W., ... Wash., D. C., engineer and architect servi... by W. P. Day & Associates, 1502 Financ... Center Bldg., San Francisco, for NOY 10... and 5377, at N.D.D., NOY 7643; by T. ... Pflueger, 580 Market St., San Francisco, ... acetylene plant, NOY 7683; by A. W. Es... 233 Sansome St., San Francisco, for NO... 5208, N.D.D., NOY 7730.

†**Calif., Oakland**—Home Owners' Loa... Corp., 1440 Broadway, Oakland, Zone ... plans by P. H. Hammarberg, 2 Norberg Ave... Berkeley, converting residence at 267 Lee... Ave. into 4 living units, Case No. W-B-11... $8,000.

†**Calif., Richmond**—Yards & Docks, Na... Dpt., 18 St. and Constitution Ave. N.W., ... Wash., D. C., engineering services by Sout... western Eng. Co., 4800 Santa Fe Ave., L... Angeles, on NOY 5600, Naval Fuel Depot, ... Molate, NOY 7691.

†**Calif., San Diego**—Yards & Docks, Na... Dpt., 18 St. and Constitution Ave. N.W., ... Wash., D. C., engineering services by Sout... western Eng. Co., 4800 Santa Fe Ave., L... Angeles, on NOY 5440, Naval Fuel Depo... NOY 7675.

†**Calif., San Pedro**—Yards & Docks, Na... Dpt., 18 St. and Constitution Ave. N.W., ... Wash., D. C., engineering services by Sout... western Engineering Co., 4800 Santa Fe Av... Los Angeles, on NOY 5596, Naval Fuel Depo... NOY 7690.

†**Calif., San Pedro**—Yards & Docks, Na... Dpt., 18 St. and Constitution Ave. N.W., ... Wash., D. C., engineer and architect servi... by Consoer, Townsend & Quinlan, 211 ... Wacker Dr., Chicago, Ill., NOY 4278, 39... Naval Operating Base, NOY 7644.

†**Colorado**—U. S. Eng., 909 17 St., Denv... bldg. addn., Eagle Co.

†**Colo., Kokomo**—Pub. Housing Auth., NH... Dierks Bldg., 1006 Grand Ave., Kansas C... Mo., 15 family dwelling units, Colo. 5109.

†**Connecticut**—Pub. Housing Auth., NH... 24 School St., Boston, Mass., bids soon sewa... treatment and collection sys., Conn. 6063 a... 6084. Payne & Keefe, 231 State St., N... London, engrs. CD 6/22—ENR 6/24.

†**Connecticut**—Republic Steel Corp., Repu... lic Bldg., Cleveland, O., addnl. plant fac... ties. Approx. $240,000. Defense Plant Co... will finance. CD 3/31—ENR 4/8.

Conn., Wethersfield—State, Prison ... Trustees, State Capitol, Hartford, unit ... criminally insane, State Prison. Over $150,0...

†**Del., New Castle**—Federal Works Agen... 601 State Planters Bank Bldg., Richmond, ... Va., school bldg., Del. 7-109.

†**Fla., Ft. Walton**—Okaloosa Co. School B... school bldg. exten. $48,000. **FWA.**

†**Fla., Key West**—City, bids soon recreat... facilities. $36,180. **FWA.**

†**Idaho, Farragut**—Yards & Docks, Na... Dpt., 18 St. and Constitution Ave. N.W., ... Wash., D. C., engineering services by Fuge... Olsen, Urban & Neller, 520 North Michig... Ave., Chicago, Ill., on CPFF 5493, bl... NOY 7735.

†**Me., Portland**—Federal Wks. Agency, ... Chauncy St., Boston, Mass., plans by Miller ... Beal, Inc., 465 Congress St., Portland, bri... school.

†**Md., Great Mills**—St. Marys Co. Bd. Ed... Leonardtown, plans by J. J. Baldwin, 927 ... St. N.W., Wash., D. C., 1 story, brick, cin... block, 10 classroom high school bldg. **FW...**

†**Massachusetts**—U. S. Eng., 819 Indust... Trust Bldg., Providence, R. I., plans by ... Shaw, engr. and archt., 25 Huntington Av... Boston, bldgs., No. 51W-37-018-Eng-... Hampden Co.

†**Massachusetts**—Sylvania Electric Produ... Inc., Emporium, Pa., addnl. plant facili... $370,000. Defense Plant Corp. will finance.

†**Michigan**—Ford Motor Co., 3674 Schae... Rd., Dearborn, addnl. plant facilities. $300,0... Defense Plant Corp. will finance.

BLIC BLDGS. (Proposed Work, Cont'd.)

Michigan—Pub. Housing Auth., NHA, 2073 St., Cleveland, O., plans by Harley, Ellington & Day, Stroh Bldg., Detroit, temporary dwellings, MI 20036. CD 9/29.

Miss., Grenada—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Ned Sts., Atlanta, Ga., 40 family dwelling units, Miss. 22176.

Ohio—Eagle Rubber Co., Inc., Orange St., Cleveland, rebuilding factory. $80,000. Federally financed.

Ohio—National Advisory for Aeronautics, Ed. R. Sharpe, administrative mgr., Airport, Cleveland, research bldg. for testing Super-charges. $3,000,000. Awaiting Government appropriation. B. G. Gulich, c/o owner, engr.

Ohio—Pub. Housing Auth., NHA, 2073 E. 9th St., Cleveland, plans by Akron Associated Architects, First Central Tower Bldg., Akron, trailer housing, Ohio 33279. CD 9/21—ENR 9/23.

O., Dayton—Pub. Housing Auth., NHA, 2073 E. Ninth St., Cleveland, 640 family dwelling units, Ohio 33286.

O., Lima—Pub. Housing Auth., NHA, 2073 E. Ninth St., Cleveland, 100 stop-gap shelter type dwelling units, Ohio 33283; 100 family dwelling units, Ohio 33283; 90 stop-gap shelter type single dormitories, Ohio 33284.

Okla., Lawton—Comrs. Comanche Co., plans by B. Hendrick, Lawton, health center, No. 34-188. FWA. CD 6/9—ENR 6/17.

Oregon—Willamette Iron & Steel Corp., 1400 N. W. Front St., Portland, plant facilities. $130,000. Defense Plant Corp. will finance.

Pennsylvania—Rohm & Haas Co., 222 W. Washington Sq., Phila., addnl. plant facilities. Approx. $330,000. Defense Plant Corp. will finance.

Pa., Borough Twp.—Federal Works Agency, 70 Park Ave., New York, 17, N. Y., school bldg. for Borough Twp. School Dist. $85,140.

Pa., Phila.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., engineering services by The Ballinger Co., 105 S. 12 St., on NOY 4186, 4444, 4969, 5387, 5485 and 5970, bldgs., NOY 7662.

Pa., Titusville—Federal Works Agency, 18 and F Sts. N.W., Wash., 25, D. C., bids soon hospital addn. CD 8/27—ENR 9/2.

R. I., Newport—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., engineering services by Charles R. McGuire & Assoc., Turkshead Bldg., Providence, on NOY 4344, 4398, 5575, 5131, bldgs., NOY 7676.

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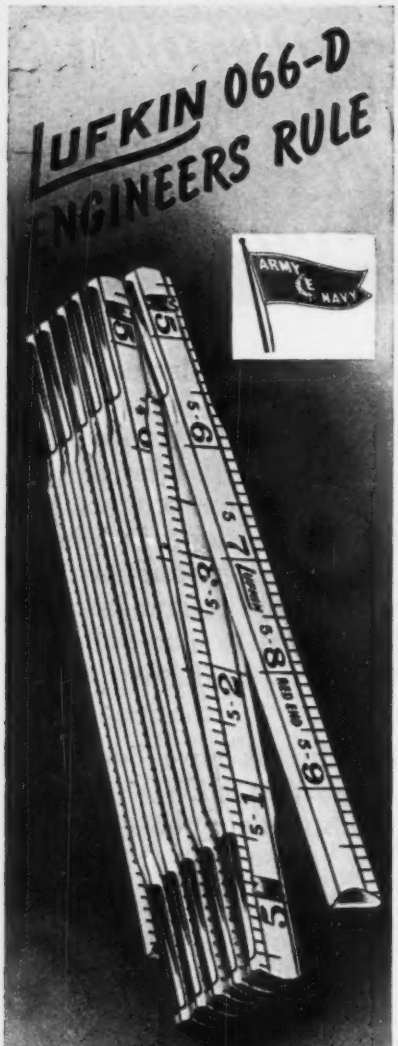

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PUBLIC BLDGS. (Proposed Work, Cont'd.)

†**R. I., Newport**—City, mayor's office, City Hall, plans by Charles A. Maguire & Associates, 1515 Turks Head Bldg., Providence, altering bldg., constructing addn. recreation center, Marlborough Ave. $110,000. **FWA.** CD 9/29.

★†**S. C., Charleston**—Medical Society of South Carolina, Roper Hospital, seeking more federal funds 7 story, bsmnt. hospital addn., SC 38-139. $1,100,000. Samuel Hannaford & Sons, Dixie Terminal Bldg., Cincinnati, O., archts. **FWA.** CD 9/14—ENR 9/16, under **BA.**

†**S. C., North Charleston**—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., plans by H. Tatum, 34 Broad St., Charleston, school bldgs., No. 38-213, to serve SC-38026.

★†**Tennessee** — Memphis Public Housing Auth., 264 Lauderdale St., Memphis, addnl. housing, for NHA. $9,000,000.

†**Tenn., Memphis**—City, W. Chandler, mayor, Courthouse, crematory. Over $200,000. **FWA.**

†**Tex., Galveston**—Pub. Housing Auth., NHA, 1205 Electric Bldg., Seventh and Taylor Sts., Fort Worth, 900 family dwelling units, Tex. 41614; 100 family dwelling units, Tex. 41615.

†**Tex., San Antonio**—Home Owners' Loan Corp., 720 Travis Bldg., 350 family or duplex housing units. $450,000.

†**Tex., Sweetwater**—Pub. Housing Auth., NHA, 1205 Electric Bldg., Seventh and Taylor Sts., Fort Worth, 40 family dwelling units, Tex. 41613.

†**Utah, Wattis**—Pub. Housing Auth., NHA, Dierks Bldg., 1006 Grand Ave., Kansas City, Mo., 10 family dwelling unit addn. to housing, Utah 42162.

†**Washington**—Pub. Housing Auth., NHA, Skinner Bldg., 5 Ave. and Union St., Seattle, Zone 1, water and sewerage sys. for housing, No. 45275. $10,000. G. D. Hall, Larson Bldg., Yakima, engr.

†**Washington**—Pub. Housing Auth., NHA, Skinner Bldg., 5 Ave and Union St., Seattle, Zone 1, plans by Jones, Bouillon, Thiry & Syliiassen, 715 Hoge Bldg., Seattle, Zone 4, converting construction camp into dormitories, cafeteria and community bldg., Wash. 45242. $74,000. CD 9/21—ENR 9/23.

†**Washington**—U. S. Eng., 800 3 Ave., Seattle, Zone 4, cold storage facilities, Neg. 756, Spokane Co.

†**Wash., Auburn**—Pub. Housing Auth., NHA, Skinner Bldg., Fifth Ave. and Union St., Seattle, 240 family dwelling units, Wash. 45240, and 72 dormitory units, Wash. 45241.

†**Wash., Bremerton**—City, City Hall, plans by Naramore & Brady, Dexter Horton Bldg., Seattle, Zone 4, 2 fire stations, Project 45-267. $187,150. **FWA.**

†**Wash., Moses Lake**—City, plans by L. Solberg, Wenatchee, school, Project 45-263. $68,000. **FWA.**

†**Wash., Moses Lake**—Pub. Bldgs. Admin., 18 and F Sts. N.W., Wash., D. C., recreation bldg., Docket 45-258. $11,550. **FWA.**

†**Wash., Port Orchard**—South Kitsap School Dist. 402, Port Orchard, plans by F. B. Stephen, Smith Tower, Seattle, Zone 4, 2 story high school addn., Proj. 45-119. $32,190. **FWA.**

†**Wash., Seattle**—Seattle School Dist. 1, $10 Dexter Ave., Zone 9, plans by Holmes & Bain, Smith Tower, Zone 4, school at Rainier Vista, $24,450; plans by Stuart, Kirk & Durham and Cherry Bldg., Zone 4, school, High Point, $117,300; plans by Naramore & Brady, Dexter Horton Bldg., Zone 4, school at Duwamish Bend, $158,250, addn. to Cooper School, $61,531; addn. to Van Asselt School, $61,531, Docket 45-257. **FWA.**

†**Wash., Spanaway**—Spanaway School Dist., Spanaway, plans by W. A. Johnson, Rust Bldg., Tacoma, 56x124 ft., frame school. $40,000. **FWA.**

†**Wash., Tacoma**—Pierce Co., Courthouse, plans by C. R. and C. V. Rueger, Puget Sound Bank Bldg., remodeling ground floor of building S 9' and Pacific Sts. for health center, Proj. 45-266. $62,976. **FWA.**

B. C., Vancouver—Dpt. Pensions & Natl. Health, Daly Bldg., Mackenzie Ave., Ottawa, Ont., colony units for treatment convalescent veterans, $350,000.

N. B., Edmundston—J. H. Proult, mayor, 150 bed hospital. $400,000.

N. B., Edmundston—J. H. Proult, mayor, vocational school, town hall and fire station. $200,000.

N. B., Lakeburn (Postal Dist. Moncton)—Wartime Housing, Ltd., 55 York St., Toronto, Ont., 100 dwellings. $350,000.

N. B., Mispec (Postal Dist. St. John)—Dominion Govt., Ottawa, Ont., plans by Dpt. Naval Services, Cartier Sq., Ottawa, Ont., naval hospital. $150,000.

P. E. I., Charlottetown — Province of Prince Edward Island, Charlottetown, provincial sanatorium addn. $150,000.

★**Que., Hull**—Dominion Govt., Ottawa, Ont., plans by Dpt. P. Wks., Ottawa, Ont., building for occupancy by National Film Board. $1,000,000.

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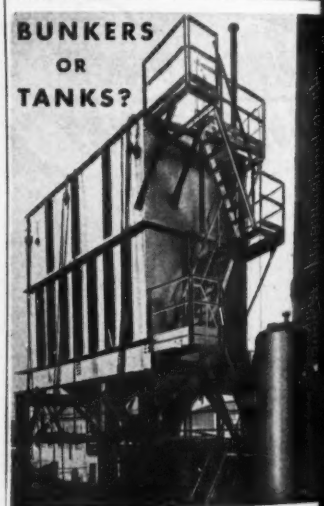

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LIC BLDGS. (Proposed Work, Cont'd.)

..., Montreal—Dpt. Pensions & Natl. ..., Daly Bldg., Mackenzie Ave., ..., Ont., colony units for treatment of ...ecrat veterans, $700,000.

..., Riviere du Loupe—R. C. School Comn., ...rised bond issue school imprvs., exten. ...ted.

ASKED

Bids Asked after October 5

...sylvania—Pub. Housing Auth., NHA, ...ney., New York, 7, N. Y., community ..., Pa. 35181, for Allegheny County Hous- ...Auth., 201 County Office Bldg., Pitts- ... Plans deposit $25. CD 9/16—ENR ...

...higan—Pub. Housing Auth., NHA, 2073 ... St., Cleveland, O., temporary family ...ings, MI 20180. Extended date. Plans ...it $50. Otis Winn & P. Breaner, High- ... Park, archts. CD 9/9—ENR 9/16.

Bids Asked October 11

..., Old Orchard—Federal Works Agency, ...hauncy St., Boston, Mass., school, Me. ..., for Town, Bd. Selectmen, Town Hall. ... Harriman, 18 Shepley St., Auburn, ... CD 9/29.

...rginia—Pub. Bldgs. Admin., 18 and F ... N.W., Wash., 25, D. C., high school, ...rton Co.

Bids Asked October 12

..., Longueuil—Dpt. Munitions & Supply, ..., Ont., guard house, Kardex office and ...r storage bldg. and carpenter shop at ...aft plant, for Canadian Pratt & Whitney ... Ltd., Longueuil. About $44,000.

Bids Asked October 15

...laska, Anchorage—Pub. Housing Auth., ... Skinner Bldg., 5th Ave. and Union St., ...tle 1, Wash., housing units, Project ... W. J. Bain, 2800 Smith Tower, Seattle, ...ash., archt. CD 9/22—ENR 9/30.

...laska, Fairbanks—Pub. Housing Auth., ... Skinner Bldg., 5 Ave. and Union St., ...tle 1, Wash., housing, Project 50071. ... Bain, 2800 Smith Tower, Seattle, 4, ..., archt.

...w Mexico—Pub. Housing Auth., NHA, ...Electric Bldg., Seventh and Taylor Sts., ...Worth, Tex., family dwelling units, NM ... Plans deposit $50. W. C. Kruger, Box ...anta Fe, archt. CD 8/19—ENR 9/2.

Bids Asked October 18

...lifornia—City of Oakland Housing Auth., ...nion St., Oakland, family dwelling units, ... 4749, Calif. 4770 and Calif. 4771, for ... J. Donovan, 950 Parker St., Berkeley, ... CD 9/30—ENR 9/16.

...ssissippi—U. S. Eng., U. S. Post Office & ...house, Vicksburg, remodeling old post ... bldg., Solic. 23-052-44-25, Warren Co.

..., Lemay (St. Louis P. O.)—School ...of Mehlville, St. Louis Co., c/o L. Wit- ...ves Bd. Mehlville High School Bldg., ...school bldg. addn., Lemay Ferry Rd. and ... Ave., Mo. 23-163. Plans deposit $20. ... & Froese and Johnson and Maack, ...ated Archts., 705 Olive St., St. Louis, ... archts. CD 4/26—ENR 4/29.

Bids About October 19

...higan—Pub. Housing Auth., NHA, 2073 ... St., Cleveland, O., temporary family ...ings, MI 20193. Plans deposit $50. Hew- ...Lockenbach & O'Dell, Dime Bank Bldg., ... archts. CD 9/22—ENR 9/30.

...gon—Pub. Housing Auth., NHA, Skinner ... Ave. and Union St., Seattle, 1, Wash., ...ily dwelling units, Ore. 35275. H. A. ... Fenton Bldg., Portland, archt. CD ...ENR 9/30.

..., Nassawadox—Office A. M. Lublin, ... Dickson Bldg., Norfolk, hospital addn., ...-122, for Northampton Accomack Me- ... Hospital. $97,900. **FWA.** Extended ...CD 9/13—ENR 9/16.

..., Ste Anne De Bellevue—Secy. Dpt. P. ..., Ottawa, Ont., 5 story, 243 ft. long ... and infirmary bldg. with two 43x99 ft. ...at Military Hospital. $500,000. C. D. ...and, Ottawa, Ont., archt. CD 9/14— ...9/16.

Bids Asked October 21

...Sidney—Pub. Bldgs., Admin., 18 and F ...W., Wash. 25, D. C., hospital addn., ...31-248. Extended date. **FWA.** F. E. ..., Sidney, archt. CD 8/20—ENR 8/26.

Bids Asked October 22

...shington—Pub. Housing Auth., NHA, ...r Bldg., 5 Ave. and Union St., Seattle, ... family dwelling units, Wash. 45283. ...Maloney, Larson Bldg., Yakima, archts. ...2—ENR 9/30.

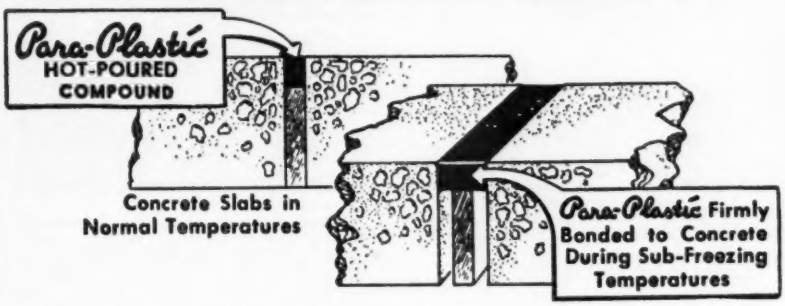
...C., New Bern—Pub. Bldgs. Admin., 18 ... Sts. N.W., Wash., D. C., Craven ... Health Center, Docket N.C. 31-205. ...CD 8/3—ENR 8/5.

Bids Asked October 27

..., Atlanta—Pub. Bldgs. Admin., 18 and ... N.W., Wash., D. C., nurses' home, ...Hospital, Docket Ga. 9-235. **FWA.** CD ...ENR 9/2.

Para-Plastic

HOT-POURED RUBBER-LIKE WATERPROOF SEALING COMPOUND



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Costly delays resulting from water hazards have been eliminated on hundreds of important construction projects during many years of service, by COMPLETE WELLPOINTS. Immediate stock shipments—sales or rentals—serviced and sold by one of the largest organizations of its kind.

2 to 5 stage Jetting Pumps available

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MACH'Y & EQUIPM'T CO., Inc.
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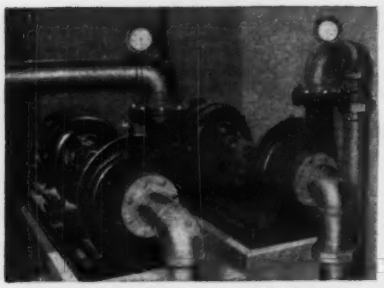
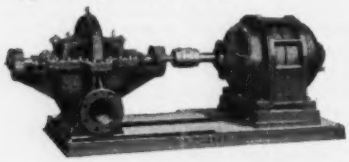
DEMING PUMPS



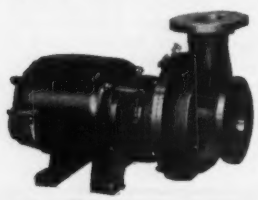
SIDE SUCTION CENTRIFUGAL PUMPS

These pumps can be furnished for belt, electrical motor, or gasoline engine drive. Sizes range from 1 to 10 inches with capacities from 10 to 3600 g.p.m. Single ball bearing and two ball bearing types. Ask for Bulletin 4200.



DOUBLE SUCTION CENTRIFUGAL PUMPS

Horizontally split casing. Recommended for working pressures up to 200 pounds. Rotating elements in perfect static and dynamic balance. Vibrationless at all speeds. Sizes 1½ to 10 inches. Capacities up to 5000 g.p.m. at heads up to 350 feet. Ask for Bulletin 5003.



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Compact, dependable, high efficiency, low cost units. Available in 63 sizes. Capacities range from 5 to 650 g.p.m. Complete details, specifications, and key to selection chart included in Bulletin 4301. Ask for it.

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Contains Engineering Data on All Types of Deming Pumps

THE DEMING COMPANY
SALEM • OHIO
PUMP MANUFACTURERS SINCE 1880

PUBLIC BUILDINGS (Bids Asked, Cont'd.)

Bids Asked after October 30

†**Pennsylvania**—Pub. Housing Auth., NHA, 270 Bway., New York, 7, N. Y., site imprvs., Pa. 36201, for Allegheny County Housing Auth., 201 County Office Bldg., Pittsburgh. Plans deposit $20. CD 9/23—ENR 9/30.

Bids Asked

†**Massachusetts**—U. S. Eng., Park Sq. Bldg., Boston, (selected bidders) bldgs., No. 19-023-44 Neg. 77, Barnstable Co. $20,000.

†**Massachusetts**—U. S. Eng., Park Sq. Bldg., Boston. (selected bidders) bldgs. No. 19-022-44 Neg. 79, Essex Co. $20,000.

†**Me., Brunswick** — St. Johns Parochial School, c/o Rev. Wm. Dauphin, Pleasant St., reconstructing 2 story, bsmnt. school, $75,000. Plans deposit $15. FWA. A. J. Harriman, 88 Shepley St., Auburn, archt. CD 9/28—ENR 9/30.

†**New Jersey**—U. S. Eng., 120 Wall St., New York, 5, N. Y., addnl. bldgs., Hudson Co. $200,000.

†**North Carolina**—U. S. Eng., 32 Customhouse, Charleston, S. C., addnl. bldgs., No. 231-44-59, Robeson Co.

†**North Carolina**—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., water distr. sys. for housing, NC 31027, 31029, 31073 and 31074. Plans deposit $50. J. N. Pease & Co., Inc., Johnston Bldg., Charlotte, engrs. archts.

†**Ohio**—C. W. Conklin, archt., Farmers Bank Bldg., Mansfield, 4 story, 60x100 ft. factory, for Mansfield Tire & Rubber Co., Mansfield. $80,000. Federally financed.

†**Pennsylvania**—Pub. Housing Auth., NHA, 270 Bway., New York, 7, N. Y., tenant activities facilities, Pa. 36241, for Allegheny County Housing Auth., 201 County Office Bldg., Pittsburgh. Plans deposit $25. CD 9/16—ENR 9/23, under BA.

†**Pennsylvania**—Pub. Housing Auth., NHA, 270 Bway., New York, 7, N. Y., community bldg., Pa. 36152, for Allegheny County Housing Auth., 201 County Office Bldg., Pittsburgh. Plans deposit $25. CD 9/9—ENR 9/16.

†**Rhode Island**—Pub. Housing Auth., NHA, 24 School St., Boston, Mass., disposal plant, sewerage sys., for housing, RI 27050 and 27022. $85,000. Charles A. Maguire & Associates, 1515 Turks Head Bldg., Providence, engrs. CD 9/21—ENR 6/24.

†**Texas**—U. S. Eng., 231 W. Main St., Denison, housing, Grayson Co. $100,000. CD 9/23—ENR 9/30.

★ †**Texas**—McCrossin Engineering Co., 120 Wall St., New York, N. Y., pig iron blast furnace plant and chemical unit, $3,500,000. Defense Plant Corp. will finance.

†**Texas**—Pub. Housing Auth., NHA, 1205 Electric Bldg., Seventh and Taylor Sts., Fort Worth, temporary family dwelling units, Tex. 41598. Hedrick & Lindsley & C. L. Ellis, Southern Standard Bldg., Houston, archts. CD 9/27, under BA.

LOW BIDDERS

†**California**—Pleasanton Housing Auth., 47 Neal St., Pleasanton, dormitory accommodations, Calif. 4755 and family dwelling units, Calif. 4754, from Close & Lewis, 721 C St., Hayward, $224,100. CD 8/31—ENR 9/2.

★ †**California**—Pub. Housing Auth., NHA, 785 Market St., San Francisco, family dwelling units, Calif. 4745, from L. H. Hansen & Sons, P.O. Box 1784, Fresno, $517,845. CD 9/24.

†**Colorado**—U. S. Eng., 909 17 St., Denver, bldgs., Denver Co., from E. B. Jones, Jr., 1010 S. Josephine St., Denver, under $100,000. CD 9/13.

†**Florida**—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., Sept. 27, dormitory and family dwelling units, Fla. 3220 and 3221, from D. M. Rickenbacker, Union, S. C., $174,500. CD 9/20.

†**Fla., Panama City**—Federal Works Agency, 18 and F Sts., Wash., D. C., Sept. 28, 22 classroom school, Michigan and Magnolia Sts., Fla. 8-268, from Albritton-Williams Co., Quincy, $179,042. CD 9/14—ENR 9/23.

★ †**New Jersey**—Pub. Housing Auth., NHA, 270 Bway., New York, 7, N. Y., Sept. 24, housing, NJ 28162, from Mutual Const. Corp., 7 E. 42 St., New York, N. Y., $579,420. CD 9/15—ENR 9/26.

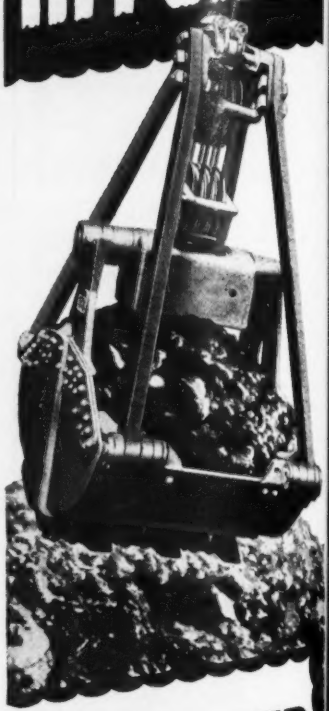
†**Ohio**—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, Sept. 23, housing, Ohio 33245, from Henke Constr. Co., 203 E. Walton St., Chicago, Ill., $384,000. CD 9/14—ENR 9/16.

★ †**Oklahoma**—Pub. Housing Auth., NHA, 1205 Electric Bldg., Fort Worth, Tex., Sept. 23, family housing, Okla., 34076, from J. P. Snyder, Cherry Lane, Fort Worth, Tex., $579,000. CD 9/9—ENR 9/16.

†**Oklahoma**—U. S. Eng., 231 W. Main St., Denison, Tex., bldgs., facilities, Sol. 257-44-55, Comanche Co., from W. A. Zant, Box 275, Lawton, $760,000.

★ †**Wash., Renton**—Pub. Bldgs. Admin., 18 and F Sts. N.W., Wash., 25, D. C., Sept. 24, 1 story, masonry hospital, from M. Hoard Eng. Co., 1331 3 Ave. Bldg., Seattle, Zone 1, $1,432,012. FWA. CD 9/29, under LB—ENR 9/2, under CA.

HAISS HI-POWER



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BLIC BUILDINGS (Cont'd.)

TRACTS AWARDED

rk., Benton—State Hospital Bd., Little k, repairing bldgs., to G. W. May Constr. 4501 Asher St., Little Rock, $162,755. rded CD 9/17—ENR 9/19.

California—U. S. Eng., 74 New Montgomery St., San Francisco, bldgs., Spec. 1140. Francisco Co., to Morrison-Knudsen Co., and Ford J. Twaits Co., 451 South Boyl- St., Los Angeles. Est. under $1,000,000.

D. C., Wash.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N. W., addnl. ing and recreational facilities, WAVE ters D, Nebraska and Massachusetts , NOY 7068, to Harwood-Nebel Constr. Inc., 1520 K St. N.W., $1,121,500. CD

Georgia—U. S. Eng., Post Office Bldg., nnah, bldg., to L. J. Lehotay Co., Co- us. $59,000.

Idaho, Farragut—Yards and Docks, Navy 18 St. and Constitution Ave. N.W., Wash., addns. to dispensary and new dispensary. al Training Station, NOY 6828, to Ander- Building Co. 2003 N.W. Blvd., Spokane, h. $116,260. (**Correction** — location of ject). CD 9/30.

Ill., Glenview—Yards & Docks, Navy Dpt., St. and Constitution Ave. N.W., Wash., C., second heating plant addn., Naval Air ion, NOY 7197, to B-W Constr. Co., 307 Michigan Ave., Chicago, $58,300.

Ind., Bunker Hill—Yards & Docks, Navy 18 St. and Constitution Ave. N.W., h., D. C., storehouse and 2 administration addns., Naval Air Station, NOY 7315, James I. Barnes Constr. Co., Logansport, $54,940.

Kentucky—Pub. Housing Auth., NHA, E. 9 St., Cleveland, O., temporary fam- dwellings, Ky 15102, to Henke Const. Co., E. Walton St., Chicago, Ill., $429,000. about 8/25, awarded 9/24. CD 8/2— R 8/5.

Massachusetts—Pub. Housing Auth., NHA, School St., Boston, housing, Mass. 19085 19087, to Merritt Bldg. Co., Inc., 74 Good- St., Bridgeport, Conn., $334,735 Bids 9/30. 9/9—ENR 9/16.

Maine—U. S. Eng., 31 St. James Ave., Bos- Mass., temporary bldgs., No. 19-023-44- 45, Penobscot Co., to Davison Constr. 1206 Elm St., Manchester, N. H. Est. r $50,000.

Michigan—U. S. Eng., 700 Union Guard- an Bldg., Detroit, bldg., Wayne Co., to H. Martin Constr. Co., 955 E. Jefferson , Detroit. Est. under $1,000,000.

Michigan—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, O., temporary family llings, Mich. 20191, to Toval Constr. Co., W. Monument St., Baltimore, Md., $828,800. 8/24.

Mississippi—U. S. Eng., Grant St. west of wood St., Mobile, Ala., bldg., Rankin Co., E. Rubush, Meridian, under $50,000.

New Jersey—Eclipse Aviation Corp., div. dix Aviation, Bendix, engineering test to Frank Bogert Co., 324 Railroad Ave., tensack. $50,000. Federally financed. 9/20. CD 9/14—ENR 9/16.

New Jersey—Heyden Chemical Co., 50 Union Sq., New York, N. Y., penicillin plant bldg., to Walter Kidde Construc- Inc., 140 Cedar St., New York, N. Y. $1,000,000 incl. equip. Austin Co., 19 ter St., New York, N. Y., engr. Defense t Corp. will finance.

New Jersey—Pub. Housing Auth., NHA, Bway., New York, 7, N. Y., clearing, ding, excavating Park Dr., for NJ 28071, Francisco Const. Co., 10 Ridge Rd., Little $48,281. CD 9/20—ENR 9/23.

N. J., Lakehurst—Yards & Docks, Navy 18 St. and Constitution Ave. N.W., h., D. C., engine test cell building, at al Air Station, NOY 6591, to Mahony- st Constr. Co., 657 Main St., Passaic, 278.

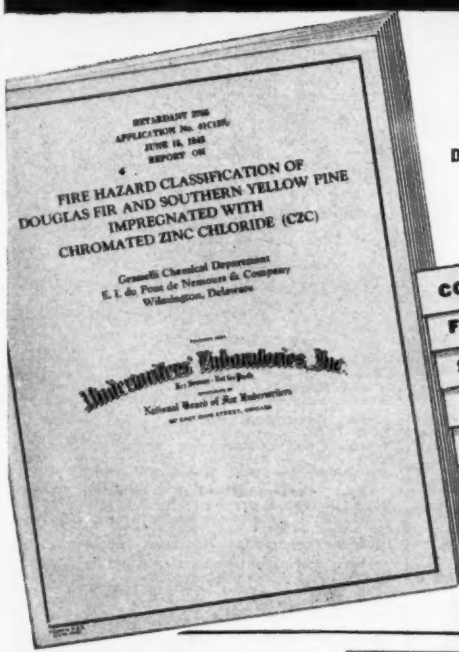
N. C., Edenton—Yards & Docks, Navy 18 St. and Constitution Ave. N.W., h., D. C., synthetic training bldg., etc., A.S., NOY 6939, to William Muirhead str. Co., Inc., Durham, $193,325.

North Carolina—U. S. Eng., 33 Customhouse, arleston, S. C., bldgs., Spec. 231-44-49, Meck- burg Co., to E. Foard, Piedmont Bldg., arlotte, under $50,000. Bids 9/22.

New York—Chas. Pfizer & Co., 11 Bartlett Brooklyn, boiler house, tank installation, ring ice house and engine room for pen- in mfg. plant, to W. J. Barney Corp., 101 rk Ave., New York. Zone 17, $125,000. incl. equipment installation $250,000. ense Plant Corp. will finance.

Ohio—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, housing, Ohio 33263, (a) wall, to Bedford Hills Constr. Co., 90 rtford St., East Hartford, Conn., $1,437,000. 9/14. CD 9/27, under LB—ENR 8/16, or BA.

Now you can get all the facts on the FIRE-RESISTANCE OF "CZC"-TREATED WOOD



NEW AUTHORITATIVE 64-PAGE REPORT ISSUED BY ***UNDERWRITERS' LABORATORIES, INC.,*** GIVES DETAILED ANSWERS TO THESE QUESTIONS ABOUT "CZC"-TREATED WOOD:

- COMBUSTIBILITY
- FIRE RETARDANT RATINGS
- SPREAD OF FIRE
- FUEL CONTRIBUTED
- DENSITY OF SMOKE
- TOXICITY OF FUMES
- DEGREE OF PERMANENCE

This chart shows the rating applied to varying amounts of "CZC" in treated wood. Untreated wood is rated 100. Incombustible asbestos-cement board is rated 0.

FIRE HAZARD CLASSIFICATION

Factors	Retention of Dry Salts Per Cu. Ft.			
	1 lb.	2 lbs.	3 lbs.	4 lbs.
Flame spread	60	40	35	30
Fuel contributed	50	35	30	25
Smoke developed	Less than with untreated lumber			

• This report gives you distinctly useful information—new facts valuable in designing construction projects—facts you have asked for. Send for your copy today. E. I. du Pont de Nemours & Co. (Inc.), Grasselli Chemicals Department, Wilmington, Delaware.

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1/4 to 1/3

Less Steam

TO DRIVE PILES

SUPER-VULCAN

OPEN TYPE

Differential Acting

PILE HAMMERS

18c-30c-50c and 80c

You save money with a Super-VULCAN on the most extensive projects and also you realize greater speed in driving each pile for the Super-VULCAN gives you twice the blows per minute.

These points are very important ones to consider, especially now for immediate and future construction. Another way you save money is that the Super-VULCAN uses 25 to 35 per cent less steam.

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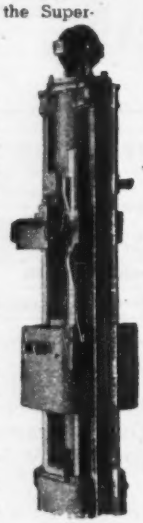

Sizes
18C—30C
50C—80C

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PUBLIC BUILDINGS (Contracts Awarded. Cont'd)

†**Oregon**—Shofner Iron & Steel Works, 2770 N.W. Yeon Ave., Portland, $6x100 ft. addnl. plant facilities, to Teller Constr. Co., Couch Bldg., Portland. Est. $75,000. Defense Plant Corp. will finance. R. Sundeleaf, Fenton Bldg., Portland, archt. CD 9/21—ENR 9/23.

★†**Ore., Astoria**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., temporary naval hospital, NOY 6806, to L. H. Hoffman, 715 S.W. Columbia St., Portland, $708,678. CD 4/15.

†**Pa., Phila.**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., radio and sound laboratory bldg., Navy Yard, NOY 6759, to The McCain Co., 1516 Summer St., $172,000.

†**R. I., Newport**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., altering boiler plant, NOB, Coddington Cove, NOY 6600, to Gilbane Building Co., 90 Calverly St., Providence, $101,831.

†**South Carolina**—WASH RACKS—U. S. Eng., Fort Jackson, 2 wash racks, No. 231-44-48, Richland Co., to M. B. Kahn Constr. Co., Columbia, under $50,000. Bids 9/25.

†**S. C., Charleston**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., subsistence and utility bldgs., garage, etc., Naval Air Station, NOY 6422, to Morris Constr. Co., News Bldg., Greenville, $192,922.

†**Tennessee**—U. S. Eng., Grant St., west of Westwood St. Mobile, Ala., storage and access road, incl. excav., limestone surfacing course, rein.-con. culvert pipe, Coffee Co., to Ryle & Murphy, Box 517, Nashville, under $100,000.

★†**Texas**—Pub. Housing Auth., NHA, 1205 Electric Bldg., Seventh and Taylor Sts., Fort Worth, family dwelling units, Tex. 41-595, to R. P. Farnsworth Co., Box 1789, Orange, $847,280. CD 9/14—ENR.

†**Tex., Corpus Christi**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., ships service storehouse, Waldron Field, NAS, NOY 6842, to H. E. Woodruff, Corpus Christi, $42,920.

†**Utah**—U. S. Eng., 32 Exchange Pl., Salt Lake City, bldg., imprvs., Tooele Co., to Gibbons & Reed, 253 W. 3 So. St., Salt Lake City, Zone 1, approx. $40,000. Bids 9/25.

†**Va., Hampton Roads**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., 6 barracks, Naval Air Station, NOY 7714, to Virginia Engineering Co., Melson Bldg., Newport News, $315,000.

†**Va., Portsmouth**—Pub. Housing Auth., NHA., Temporary Bldg. 2, 19 and D Sts. N.W., Wash., D. C., roadways and drainage at housing Va. 44084-44086, to G. R. Pace, 161 Liberty Trust Bldg., Roanoke, $56,985.

†**Va., Portsmouth**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., addnl. hospital facilities, Norfolk Naval Hospital, NOY 7239, to Virginia Engineering Co., Newport News, $379,400.

★†**Washington**—Boeing Aircraft Co., Georgetown Station, paving parking lots, constructing bus terminal, King Co., to West Coast Constr. Co., 4608 36 Ave. S.W., Seattle. Est. $625,000. Defense Plant Corp. will finance.

†**Washington**—Pub. Housing Auth., NHA, Skinner Bldg., 5 Ave. and Union St., Seattle, Zone 1, temporary housing units, Wash. 45237, to Macri & Co., 905 10 Ave. S., Seattle, Zone 44, $98,233. Bids 9/29. CD 9/22—ENR 9/30.

†**Washington**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., completion of work on CPFF contract, NOY 5965, bldg., NOY 7746, Puget Sound Area, to Austin Co., 16112 Euclid Ave., Cleveland, O.

†**Wisconsin**—A. O. Smith Corp., 3533 W. 27 St., Milwaukee, plumbing work for propeller plant, to Wenzel & Henoch Co., 1524 W. 27 St., Milwaukee, about $40,000. Bids 9/29. Defense Plant Corp. will finance. Additional to CD 9/21—ENR 9/23, under CA.

†**Wisconsin**—U. S. Eng., 520 Merchandise Mart, Chicago, Ill., temporary frame bldgs., Contr. 11-032-Eng-590, Monroe Co., to J. P. Cullen & Son, 109 S. Main St., Janesville, $400,000. CD 9/22—ENR 9/30, under LB.

B. C., Victoria—McCarter & Nairne, archts., 1930 Marine Bldg., Vancouver, 50 frame dwellings, necessary sewage and road facilities, for Wartime Housing, Ltd., 135 E. 2 St., North Vancouver, to Bennett & White Const. Co., Ltd., 510 W. Hastings St., Vancouver, $160,000. Bids 9/15.

Ont., Hespeler—Wartime Housing Ltd., 65 York St., Toronto, women's bldg., to W. H. Yates Constr. Co., Ltd., 400 Willington St. N., Hamilton. About $175,000.

COMMERCIAL BUILDINGS

PROPOSED WORK

Kan., Kansas City—Providence Hospital, 18 and Barnett Sts., revised plans by Carroll & Dean, 1220 R. A. Long Bldg., hospital expansion. $300,000. Submitted plans to FWA. CD 2/17—ENR 2/25.

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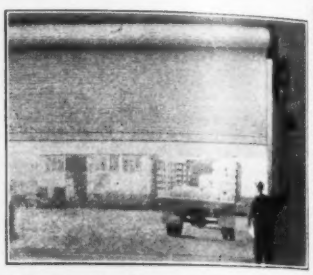

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DELAWARE BAY SHIPBUILDING CO., INC.

LEESBURG, NEW JERSEY

MMERCIAL BUILDINGS (Proposed Work, Cont'd.)

Mo., Joplin—St. John's Hospital, c/o Mother erior, Joplin, revised plans by Carroll & n, 1220 R. A. Long Bldg., Kansas City, hospital addn. $350,000. CD 9/16/42—R 10/1/42.

Mo., Kansas City—St. Luke's Hospital, A. W. Peat, chn. exec. com., 44 and Mill k Sts., plans by Keene & Simpson, 1005 d Bank Bldg., Kansas City, Mo., hospital n. and nurses home expansion. $1,000,000. plied to FWA.

N. Y., Tonawanda—E. T. Snook, et al., Summit, N. J., 2 story, bsmnt., brick, crete, steel apartment, Delaware Ave. 0,000.

O., Cleveland—Hein Bldg. Co., W. Hein, 01 Lorain Ave., thirty-six 1½ story, 29 ft. houses. $216,000.

Okla., Yantis—Warren Petroleum Co., Mar- Tex., permanent housing, facilities.

Ont., Montreal—F. W. Woolworth Co., Ltd., Bay St., Toronto, Ont., store addn. 0,000.

NTRACTS AWARDED

Calif., South San Francisco—George Arthur Sons, 941 S. Claremont St., San Mateo, 46 idences. Owner builds. **$184,000.**

La., New Orleans—Windsor Drive, Inc., Perido St., 87 dwellings, to R. P. Farns- rth & Co., 1515 S. Salcedo St., approx. 0,000. Bids 9/14. Favrot & Reed, Nola g., archts.

N. C., Wilmington—Atlantic Coast Line R. C. Mc D. Davis, pres., 3 story, rein.- office bldg., to P. S. West Constr. Co., Statesville, approx. **$200,000.** D. E. ler, Cape Fear Apts., archt. Bids 9/27. 9/15.

Nev., Sparks—O. J. Scherer & Ernest Allen, S. 3 St., Las Vegas, 60 residences in Lin- n Park. Owner builds. **$240,000.**

O., Euclid—Kenwood Village Garden, Inc., H. Bicknell, pres., 3866 Carnegie Ave., veland, 6 apartment bldgs., to Cleveland nstr. Co., 3866 Carnegie Ave., Cleveland. $300,000. Awarded 9/25. Garfield, Harris, binson & Schafer, National City Bldg., veland, archts. CD 9/27—ENR 9/30.

Ore., Portland—**Sandycrest Terraces, Inc.,** 407 Henry Bldg., 11 garden-court type artment bldgs., Sandy Blvd., at 54 and 57 ve., to J. B. Larsen, 3135 N.E. 42 St., 0,000. Awarded 9/23. H. A. Herzog, ery Bldg., archt.

Tex., Fort Worth—Defense Housing Div. p., 4330 E. Belknap St., eighty-nine 28x30 frame houses, to E. L. Baker & S. Furr, 0 E. Belknap St., **$270,000.**

Tex., Fort Worth—Linwood Development 2700 Merrimac St., 56 duplexes, to New ver Lumber Co., 300 Carroll St., Houston, prox. $200,000.

Tex., Houston—Miles Strickland, 2017 W. y, seventy-five 1 story, frame duplex dwell- gs, to White Constr. Co., 1930½ Bissonett approx. **$240,000.** J. Knostman, 2017 W. y St., archt. CD 8/16—ENR 8/19.

Tex., Houston (Galena Park)—Mensco, Inc., R. J. Newman, M & M Bldg., Houston, hundred five 1 story dwellings. Owner ldg. $475,000. CD 9/27—ENR 9/30.

Tex., Houston—Collins Development Co., Market St. Rd., four hundred 1 story, me, asbestos siding, dwellings. Owner ldg. $750,000. D. M. Duller, 2nd Natl. nk Bldg., archt.

Tex., Houston—L. V. & C. Detering, 3028 shington St., Houston, thirty-seven 1 story me dwellings, to E. T. Kelly, 3526 Wash- gton St. Approx. **$175,000.**

INDUSTRIAL BUILDINGS

OPOSED WORK

Connecticut—PLANT—Naugatuck Chemical y, Naugatuck Rubber Co., Elm St., Nauga- k, soon lets contract brick, concrete plant rvs., addns. Fletcher Thompson, Inc., 211 n St., Bridgeport, engrs.

O., Niles—UTILITIES—Niles Steel Prod- ts Div. of Republic Steel Corp., J. R. Mc- een, purch. agt., Republic Bldg., Cleve- d, soon lets contract 1 story, 50x150 ft., k, steel utilities bldg. $40,000. Keich & Brien, Union Savings & Trust Bldg., War- , archts.

R. I., Bristol—FACTORY—Bristol Lace Co., ad St., completed plans by Barker & Turoff, 1 Grosvenor Bldg., Providence, 1 story, 50x ft., 50x50 ft. wing, factory, Bayview Ave. 1/31—ENR 9/2.

Alta., Castor—PLANT—Castor Creek Col- ries, Ltd., plant bldg., equip. $57,200.

Alta., Edmonton—PLANT—Edmonton Cold rage Co., Ltd., 105 St., altering cold stor- plant. $42,970.

Alta., Edmonton—PLANT—Swift Canadian , Ltd., 66 St., rein.-con. plant addn. $216,- .

B. C., Vancouver—PLANT—Iron Bay Tim- r, Ltd., Hall Bldg., plant. $40,000. CD .

Ont., Brantford—PLANT—The Slingsby g. Co., 381 Grand River Ave., plant addn. ,100.

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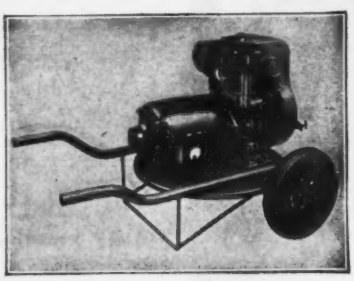

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INDUSTRIAL BUILDINGS (Proposed Work, Cont'd.)

Ont., Fort Erie—STATION—New York Central R. R. Co., 466 Lexington Ave., New York, J. W. Pfau, ch. engr. (Buffalo and East), takes bids early in 1944, new station. $100,000.

Ont., Haliburton—SAW MILL—Wessel & Stewart, Haliburton, saw mill and allied plant construction.

Ont., Madoc—MINING—Detomac Mines, Ltd., F. S. Tobin, pres., bldgs. for fluorspar bodies and diamond drilling program. $75,000.

Ont., Toronto—PLANT EXTENSIONS—de Havilland Aircraft of Canada, Ltd., Sheppard Ave., addnl. plant bldgs., incl. hangar, boiler house, central storage bldg. exten., etc., Sheppard Ave. D. Shepherd, 57 Bloor St., engr.

Que., Dolbeau—PLANT—Trans-Continental Lumber Co. Ltd., Dolbeau, plant exten. $40,000.

Que., Montreal (Ville St. Pierre)—PLANT—Canadian Car & Foundry Co., Ltd., 621 Craig St., Montreal, plant, equipment installation. $162,550.

Que., Montreal—STATION PLATFORM—Canadian National Railways, H. A. Dixon, ch. engr., 360 McGill St., soon lets contract rein. con. station platform at Central Terminal Station. About $75,000-$100,000. Plans deposit $100.

Que., St. Johns—PLANT—Garrigan Wood Products, Ltd., c/o I. Sabourin, K.C., St. Johns, cabinet making and general wood working plant. $40,000.

BIDS ASKED

Bids Asked October 12

N. C., Spencer—BOILER HOUSE—Southern Ry. Co., G. L. Sitton, ch. engr., M. W. & Structures (Eastern Lines), 713 W. Trade St., Charlotte, boiler house.

Bids Asked

Conn., Milford—FACTORY—Milford Crane & Machine, Inc., 143 Buckingham Ave., Milford, (selected bidders) brick factory addn. $40,000. Fletcher Thompson, Inc., 211 State St., Bridgeport, engr. CD 9/21—ENR 9/23.

CONTRACTS AWARDED

Alta., Castor—PLANT—Caster Creek Collieries, Ltd., Castor, new plant bldgs., day labor. $55,000. CD 9/30—ENR 10/7.

Calif., Woodland — RICE DRIER — Anton Proctor, Pedar Christiansen & Regnar Paulsen, 702 Pendegast St., rice drier bldg., to Dinwiddie Constr. Co., Crocker Bldg., San Francisco. Est. $50,000. A. G. Proctor Woodland, and Mark Falk, 251 Kearny St., San Francisco, engr.

★**Conn., Stamford**—FACTORY EXPANSION — American Cyanamid Co., 1937 West Main St., factory expansion, 5 story, 76x98 ft., Plant 12, 2 story, 62x175 ft. Plant 13, 2 story 64x300 ft. Plant 23 and 1 story, 40x60 ft. Plant 28, all brick, to Chemical Constr. Co., 1937 W. Main St., Stamford, $546,500.

Conn., Westport—PLANT—Dorr Co., Inc., Danbury Rd., brick plant addn., alterations to Tomlinson & Hawley, 472 North Ave., Bridgeport. Bids 9/14. CD 9/10.

Kan., Wichita — FACTORY — Forster Mfg. Co., 463 N. Seneca St., soy bean factory, to Goseard Co., Shirkmire Bldg. Est. $75,000.

Mo., St. Louis—PLANT—Sterling Aluminum Products, Inc., 2925 N. Market St., 1 story, 150x300 ft., brick, steel mfg. plant, to John Hill Constr. Co., Syndicate Trust Bldg., 9 and Olive Sts. Est. $40,000 incl. equip.

Mo., St. Louis—FACTORY—American Pulverizer Co., 1249 Macklind Ave., 1 story, 60x79 ft., brick factory bldg., to W. C. Harting Constr. Co., 722 Chestnut St. Est. $40,000 incl. equip. F. R. Nauman, 4910 Washington Blvd., archts.

Tex., Yantis — PLANT — Warren Petroleum Co., Marshall, 4 new units for casing head gasoline plant, force account. $100,000. CD 9/28—ENR 9/30.

Wis., Astico—WAREHOUSE—Stokely Bros. Co., 941 N. Meridian Ave., Indianapolis, Ind., 1 story, 50x140 ft. concrete blocks, steel storage warehouse, to A. E. Hutter, Beaver Dam. A. Kuenzli, 202 N. Water St., Watertown, engr. CD 8/17—ENR 8/19.

Wis., Fairwater—WAREHOUSE—American Stores Dairy Co., Fairwater, 1 story, 66x132 ft., brick, steel storage warehouse, concrete fdn., to A. E. Hutter, Beaver Dam. A. Kuenzli, 202 N. Water St., Watertown, engr.

Wis., Thorp—PLANT—Blue Moon Foods, Inc., Thorp, 1 story, bsmnt., 70x120 ft. dairy products bldg addn., 1 story, 21x40 ft., bsmnt., loading platform, constructing 3rd floor to present 84x168 ft. cheese factory, to Hoopner-Bartlett Co., 631 E. Madison St., Eau Claire.

Ont., Woodstock—PLANT—Firestone Cotton Mills of Canada, Ltd., Oxford St., plant addn., to J. A. Vance, 238 Light St., $216,000. CD 9/20—ENR 9/30.

Proposal Advertisements see p. 187
Postwar Projects see p. 162

THE MOST FOR THE MONEY — SPEED - EFFICIENCY - ECONOMY

CONSTRUCTION BY CONTRACT

THE ASSOCIATED GENERAL CONTRACTORS OF AMERICA, INC. - MUNSEY BLDG., WASH. D.C.

OFFICIAL PROPOSALS

ids: October 15, 1943 (184)

Wells, Pumping Plants, etc.

FEDERAL WORKS AGENCY
WAR PUBLIC WORKS PROJECT
NO. NY-30-142

VILLAGE OF GREENPORT, NEW YORK

Separate sealed bids for wells, pumping ants and delivery lines, in the district nown as East Marion located northeast of e Village of Greenport, and including well asings, screens, buildings, pumps, engines, pe, fittings, etc., will be received by the illage Clerk at the Village Office until 7 M. E.W.T. on October 15th, 1943, and en at said office will be publicly opened d read aloud.

The information for Bidders, Form of id, Form of Contract, Plans, Specifications, d Forms of Bid Bond and Performance ond may be examined at said office and pies thereof obtained upon payment of 0.00 for each set. Any bidder, upon re- rning such set promptly and in good con- ition, will be refunded his payment, and y non-bidder upon so returning such a t will be refunded $7.50. These Plans, ecifications and Documents may also be examined and secured at the office of Barker & Wheeler, Engineers, Room 1916, 11 Park Place, New York, N. Y.

The Village of Greenport, N. Y. reserves the right to waive any informalities in or to reject any or all bids.

Each bidder must deposit with his bid security in the amount of $1,000.00 in the form and subject to the conditions provided in the Information for Bidders.

Attention of bidders is particularly called to the requirements as to conditions of employment to be observed and minimum wage rates to be paid under the contract.

No bidder may withdraw his bid within 30 days after the actual date of the opening thereof.

JOHN KLUGE, Mayor

Greenport, N. Y.
September 28th, 1943

Notice to Contractors: Commonwealth of Massachusetts, Department of Public Works, sealed bids or proposals will be received by the Department of Public Works at its office, 4th Floor, 100 Nashua Street, Boston, Mass., until 12 o'clock noon, Tuesday, October 26, 1943 and at that place and time will be publicly opened and read. The work to be done consists of the removal and disposal of approximately 1,500,000 cubic yards of soft material and the furnishing and placing of approximately 14,000,000 cubic yards of filling by the hydraulic process for the extension of runways at General Edward Lawrence Logan Airport, East Boston. Charge for specifications is $2.00, which amount is returnable only to bidders. Proposal guaranty shall consist of a certified check for $100,000.00 payable to the order of the Department of Public Works or other security satisfactory to the Department. A bid bond will not be accepted. The successful bidder will be required to furnish a bond for the faithful performance of the contract in such sum as may be fixed by the Department. The surety may be a surety company or securities satisfactory to the Department. Attention is called to the minimum rate of wages to be paid on the work as determined by the Commissioner of Labor and Industries under the provisions of Chapter 461 of the Acts of 1935. Complete information may be obtained from the office of the Department. Right reserved to waive any informality in or to reject any or all proposals. A proposal which includes for any item a bid that is abnormally low or high may be rejected as unbalanced. By: Herman A. MacDonald, Commissioner of Public Works, October 2, 1943. (185)

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This WHERE TO BUY *Section*

supplements other advertising in this issue with these additional announcements of products and services essential to efficient and economical operation in the construction industry. Make a habit of checking this page, each issue.

Departmental Staff, ENGINEERING NEWS-RECORD

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desired by an American Engineering-Construction Company that specializes in Design and Erection of Industrial Manufacturing Plants of various kinds, inclusive of installation of the process equipment, buildings, power plants, etc. Must have had somewhat similar responsible executive position and be experienced in detail of each important feature, including procurement, sales and contacts with owners.

P-919, Engineering News-Record
330 W. 42nd St., New York 18, N. Y.

FOREMEN AND LEADERMEN WANTED

for large Southern shipyard. Must have ability to handle men. Not a temporary emergency yard but will continue operation after war. Ideal year 'round climate and housing facilities. Write E. R. Hammett,

THE INGALLS SHIPBUILDING CORP.

Pascagoula Miss.

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experienced in estimating erection costs structural steel and general plate work. Must be thoroughly experienced and have first class references. (Give at least two references.) State salary expected. Location in Birmingham, Alabama.

P-890, Engineering News-Record
330 W. 42nd St., New York 18, N. Y.

POSITIONS VACANT

These Positions Vacant advertisements are published subject to agreement by the advertisers not to consider applicants now employed on war work unless they obtain written release from present employer.

MECHANICAL ENGINEER WANTED, qualified either by experience, education; or, preferably both, to bring to completion a patented design of harvesting attachment for a mowing machine. A full working model has been built and is now being field-tested. We want a man who can prepare the necessary production drawings and later, supervise, from an engineering standpoint, the building of the machines; as well as assist in problems connected with the marketing of same. Statement of availability will be required. Give full particulars, including salary wanted and references. Apply post office box 359, Johnson City, Tennessee.

POSITION AVAILABLE with a manufacturer of pumps for the Construction Industry, located in the mid-west. Headed by young aggressive management, this company is laying plans now for post war activity in the construction field. The man for this key job should have contractor's experience and possess full knowledge of all equipment used on road construction work. Technical training not required, but desirable. He will work closely with both engineering and sales. Excellent opportunity to advance with a company that is moving forward. Applicants must be prepared to furnish certificate of release from present employer. Write giving full particulars. P-898, Engineering News-Record, 520 N. Michigan Ave., Chicago 11, Ill.

MARINE ENGINE SALES ENGINEER wanted —familiar with New York Metropolitan and suburban area. State educational and experience qualifications also salary expected—confidential. P-914, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

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ENGINEER, thoroughly experienced in design of towers for Radio, Transmission Lines, etc. Please give age, education, experience, salary expected, references and draft status. Plant situated in Central Ohio. P-905, Engineering News-Record, 520 N. Michigan Ave., Chicago 11, Ill.

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CIVIL ENGINEER graduate; 34 years experience; design and construction; water supply; industrial plants; power plants; hydroelectric developments. PW-915, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

CIVIL ENGINEER—Experienced in design, construction and operation of water, sewer and electric utilities. Also extensive Water Waste Surveys. Employed but have release agreement. Age 45. Graduate. PW-916, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

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(Continued on opposite page)

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